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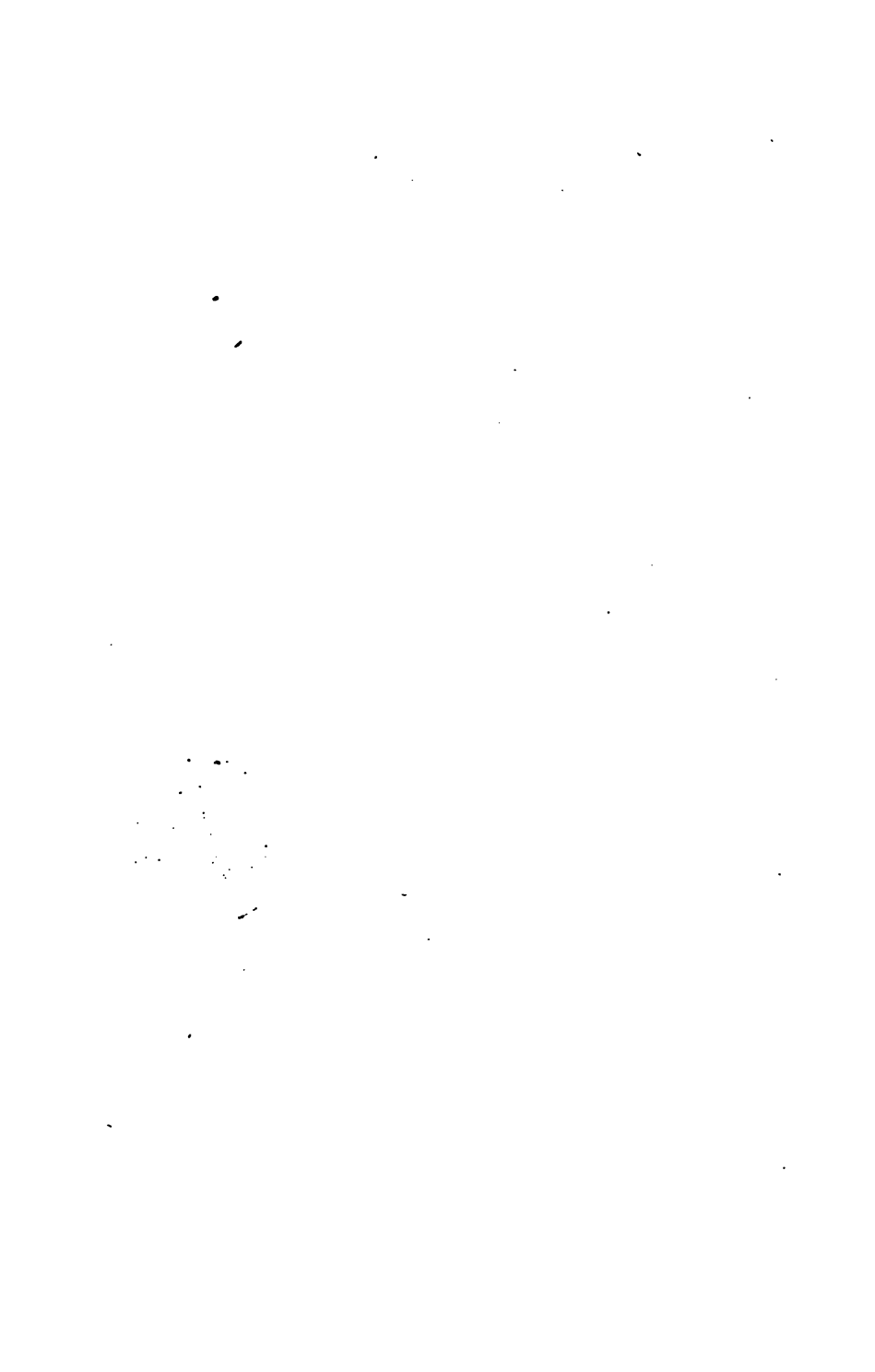
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HUMANITY TO HONEY BEES:

OR,

PRACTICAL DIRECTIONS

FOR THE

MANAGEMENT OF HONEY BEES

UPON AN IMPROVED AND HUMANE PLAN,

BY WHICH THE

LIVES OF BEES MAY BE PRESERVED, AND ABUNDANCE OF HONEY

OF A SUPERIOR QUALITY MAY BE OBTAINED.

BY THOMAS NUTT.

— Vos non vobis mellificatis Apes.
Sic —————

VIRGINIA



WISBECH:

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1832.

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government, or government of insects, exhibits to man the most perfect pattern of devoted attachment, and of true allegiance on the part of the subject-Bees to their Sovereign, and of industry, ingenuity, prosperity, and apparently of general happiness in their well-ordered state,—and as these most curious and valuable little creatures have hitherto been most cruelly treated—have been, and still are, annually sacrificed by millions, for the sake of their *sweet* treasure; I do feel a pleasure, and think there is a sort of analogical propriety, in dedicating to your Gracious Majesty this work, the leading feature of which is Humanity to Honey Bees. Under your Majesty's fostering and influential Patronage, I cannot but anticipate that this object will be essentially promoted, and that

the management of Bees, in this country
at least, will not hereafter reflect disgrace
upon their owners.

In this pleasing hope, I humbly beg to
subscribe myself,

YOUR MAJESTY'S

most dutiful

and

most grateful

Subject and Servant,

THOMAS NUTT.

Moulton-Chapel, Lincolnshire,

Nov. 27th, 1832.

PREFACE.

COULD I disarm criticism as easily as I can deprive Bees of their power to sting, this would be the proper place to do so; though I am doubtful whether it would be well-judged in me, or to my advantage, to stay the critics' pen. But, possessing no such talismanic power, I shall adventure my little book into the world, without any attempt to conciliate the critics' good-will, or to provoke their animosity, conscious that from *fair* criticism I have nothing to fear. That I shall be attacked by those apiarians who are wedded to their own theories and systems, however faulty, is no more than I expect: of them, I trust, I have nowhere spoken disparagingly; towards none of them do I entertain unkindly feelings—far otherwise. Their number, I am led to believe, is not formidable; and as

gentlemen, and fellow-labourers in the same work of humanity, their more extensive learning will hardly be brought to bear against me with rancour and violence. Should any one of them, or of any other class of writers, so far degrade himself, I shall have the advantage of the following preliminary observation, viz. that one set of my collateral-boxes, placed in a favourable situation, and *duly and properly attended to*, for one season only, will outweigh all the learning and arguments that can be adduced against my Bee-practice,—will be proof positive, visible, tangible, that there is in my pretensions something more than empty boast. Luckily for me, there are plenty of those proofs to be met with in the country, and there are some—several, not far from town; they are at Blackheath, at Kensington, at Clapham, and at other places. As hundreds of the Nobility and Gentry of this country will recollect, there was one of these incontrovertible proofs of the truth of what I am stating exhibited for several weeks at the National Repository last autumn, where it was seen, examined, admired, and, I may without any exaggeration add, *universally approved*. Practice, which has resulted from more than ten years' experience in the management of an

apiary, and from innumerable experiments, carried on, and a hundred times repeated, during that period, is what I ground the utility of my discoveries upon. To theory I lay no claim. Born and brought up in the fens of Lincolnshire, where I have spent the greater part of my life amidst difficulties, misfortunes, and hardships, of which I will not here complain, though I am still smarting under the effects of some of them, my pretensions to learning are but small: for, though sent to the respectable Grammar School at Horncastle in my boyhood, my education was not extended beyond writing, arithmetic, and merchants' accompts. As soon as it was thought that I had acquired a competent knowledge of these useful branches of education, it was my lot to be bound apprentice to learn the trades and mysteries of grocer, draper, and tallow-chandler. Whilst endeavouring to gain an honest livelihood as a grocer and draper at Moulton-Chapel, in 1822, I was afflicted with a severe illness, which, after long-protracted suffering, left me as helpless as a child, the natural use and strength of my limbs being gone; and, though supported by and tottering between my crutches, it was a long time before I was able

to crawl into my garden. Fatigued and exhausted with the exercise of journeying the length of a garden-walk of no great extent, it was my custom to rest my wearied limbs upon a bench placed near my Bees. Seated on that bench, I used to while away the lingering hours as best I could, ruminating now on this subject, now on that, just as my fancy chanced to fix. Among other things my Bees one day caught my attention: I watched their busy movements,—their activity pleased me,—their humming noise long-listened to became music to my ears, and I often fancied that I heard it afterwards when I was away from them. In short, I became fond of them and of their company, and visited them as often as the weather and my feebleness would permit. When kept from them a day or two, I felt uneasy, and less comfortable than when I could get to them. The swarming season arrived; and with it ideas took possession of my mind which had not until then possessed it:—I conceived that swarming was an act more of necessity than of choice,—that as such it was an evil; but how to provide a remedy for it—how to prevent it—was a problem that then puzzled me. I studied it for a long time, and to very little purpose.

The old-fashioned method of eking did not by any means satisfy my mind; it might answer the purpose for one season, but how to proceed the next did not appear. Then the time for taking honey was approaching: to get at that treasure without destroying my little friends that had collected it, and that had, moreover, so often soothed me in my sorrow and my sufferings, was another problem that long engaged my mind. After some years' unremitting attention to my Bees, for I had formed a sort of attachment for them during the first stage of my convalescence, which never left me, an accident aided my studies by directing my attention to the effects of ventilation, as will be found related in the body of this work, and I began to make experiments, which, being repeated, varied, improved, and then gone through again, have gradually led to the development of my improved mode of Bee-management, attempted to be explained in the following pages.

At the time I have been speaking of, I had not read one single book on Bees; nor had I then one in my possession. Whatever my practice may be, it has resulted from my own unaided experience and discoveries. To books I am not indebted for any part of it: nay, had

I begun to attempt to improve the system of Bee-management by books, I verily believe, I never should have improved it at all, nor have made one useful discovery. *The Bees themselves have been my instructors.* After I had so far succeeded as to have from my apiary glasses and boxes of honey of a superior quality, to exhibit at the National Repository, where, with grateful thanks to the Managers of that Institution for their kindness to me, I was encouraged to persevere, Bee-books in profusion were presented to me, some of them by friends with names, some by friends whose names I have yet to learn. I have read them all: but nowhere find, in any of them, clear, practical directions, how honey of the very purest quality, and in more considerable quantity than by any of the plans heretofore proposed, may be taken from Bees, without recourse to any suffocation whatever, or any other violent means;—how all the Bees may be preserved uninjured;—and how swarming may be prevented. These are the grand features in my plan; and minute directions for the accomplishment of these most desirable objects are laid down in this book.

I by no means maintain that my system of Bee-management is incapable of improvement;

but I do think that the principles upon which it is founded *are right*,—that the foundation is here properly laid,—and that every apiarian, who may hereafter conform to, or improve upon, my practice, will be instrumental in contributing a part towards raising the superstructure—namely—an asylum or sanctuary for honey Bees.

As in page 67 mention is made of “a chapter on the enemies of Bees,” and no entire chapter on that subject has been given, in order to obviate any objection that such an omission may possibly give rise to, I deem it right here to observe—that, the principal articles of that chapter having been inserted dispersedly in the following pages, it became unnecessary to repeat them in a separate formal chapter.

I cannot close this preface without acknowledging myself to be under the greatest obligations to the Rev. T. Clark, of Gedney Hill. But for his assistance the following work would not have made its appearance in its present form; if indeed it had appeared at all. He has revised, corrected, connected, and arranged the materials of which it is composed; and he has moreover gratuitously added much that is original and valuable from his own rich stores of knowledge. To him I

am indebted for the selection of the Latin mottos. As an apiarian he is one of my most improved and skilful pupils, and bids fair to become an ornament to the science of Bee-management. As a mechanic he is ingenious enough to make his own Bee-boxes, and has actually made some of the very best I have yet seen. To his knowledge of mechanics it is owing that the description and explanation of each of the different boxes, of all the other parts of my Bee-machinery, and of my observatory-hive, in particular, are more detailed, clearer, and more intelligible than they would have been in my hands. As a scholar there are passages in the following work that afford no mean specimen of his abilities. I have only to regret that the reward for the pains he has taken with it must be my thanks—that it is not in my power to remunerate him for his kind labours more substantially than by this public acknowledgment of the obligations I am under, and of my sense of the debt of gratitude that is due to him.

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MANAGEMENT OF BEES.



CHAPTER I.

PERHAPS I cannot more appropriately introduce the interesting subject of the ensuing pages to the notice of my readers, than by presenting to them in this place the substance of a dialogue between a learned Lord and myself, in which several particulars relative to BEES are remarked upon and slightly discussed. It happened at the National Repository, in London, and will, I flatter myself, not only prove acceptable to the

apiarian reader, but will also supply the place of a more formal and laboured introduction.

Lord. I have six cottage-hives of Bees on my estate, and I wish to have them put upon your principle of management: by what way am I to proceed in order to the accomplishment of this desired object?

Nutt. My Lord, much depends on the state of your hives. Are they rich? Will the six hives make three good colonies?

Lord. I do not know; neither do I understand the way to unite two stocks of Bees. But admitting that *you* find three of them rich stocks, and the other three poor ones, which of them would you advise me to establish on my estate?

Nutt. Certainly, my Lord, the three rich stocks. I have two objections against uniting the Bees of a heavy hive with those of a light one. The first is—because a light hive generally produces the greatest number of Bees: and the second is—the poverty that such a practice or union brings on the light stock. By uniting the Bees of a heavy hive with those of a light one, the light hive being already incapable of supporting its own population, many persons have failed of

success: in fact it is an unhappy, i. e. a wrong move.

Lord. Explain to me, Mr. Nutt, the mode you would adopt in establishing my hives on *your* plan.

Nutt. My Lord, your Lordship's three rich hives will receive the numerous Bees of the three weak ones; consequently they will support your weak Bees through winter; and those weak Bees so united will add greatly to the labourers of your rich hives the following spring.

Lord. But I am told many of the Bees die in the winter.

Nutt. That is a fact, my Lord; but much greater numbers will die, if you allow the Bees to continue in a state of poverty and weakness until spring. You will find your weak stocks will die early in the spring; while your three heavy stocks, each of them having received one of the light or weak stocks, will, notwithstanding such addition to their numbers, be in a state of prosperity, and *all* your Bees in the greatest safety.

Lord. Do Bees, then, succeed better when in large numbers in the hives during the winter season?

Nutt. They do, my Lord.

Lord. Why?

Nutt. Because in a rich stock of Bees, their number adds to the prosperity of the hive; but in a poor and weak stock it has a different effect—a destructive one altogether.

Lord. But does not this great number of Bees tend much to weaken the stock in the winter?

Nutt. No, my Lord, if the hive or box containing them is placed in a proper winter situation: but if allowed to remain on its summer stool, certainly I should say they would waste their treasures, as well as decrease in their numbers.

Lord. Aspect and situation, then, appear to be grand objects in your practice; but let me have your opinion as to the state of the inmates of the hive: do they remain in a complete state of torpor or lethargy during the winter, as we are told they do by some of the ancient authors?

Nutt. They do, my Lord, no doubt, if the Bees are placed in proper winter quarters.

Lord. Now, Mr. Nutt, give me a description of the situation you would wish my hives or boxes to have during the winter months.

Nutt. The winter aspect for an apiary is of the greatest consequence to its success the following spring and summer. Be careful, then, to have your hives placed in a cold and dry situation, on the north side of your buildings, free from noise and unpleasant smells; in such a situation your Bees will be kept in a state of torpor; it also prevents the sudden changes of the atmospheric air within the hives: these changes so much affect the hive during winter that they often contract a disagreeable odour, in consequence of those frequent changes, to the great injury of the inhabitants of the hive. And, my Lord, if you allow your hives to remain on their summer stands, exposed to the influence of the sun, as well as to the warm and damp atmosphere about them, this enlivens and rouses the Bees from their natural sleep or torpor, and causes them to banquet on their treasured sweets, before the earth unfolds to them a new supply, consequently is injurious to them. They are also allured into the open air, when warmed by the blessed sun on the hive, and there a dense cold frequently takes them, and they fall by thousands on the ground, and become

convenient food for the feathered fowls and birds of the air.

Lord. Do you recommend feeding Bees in the autumn, or in the spring?

Nutt. Certainly, my Lord, at both these seasons, if real necessity and poverty require it. But to force Bees to a state of poverty at any time is directly contrary to the principles of my apiarian plan. It is my wish and endeavour *to keep my Bees rich*. I am content with half their pure sweets, which is generally a handsome compensation to the humane apiarian.

Lord. How much honey and wax have you in any one season taken from one set of your collateral boxes?

Nutt. I have taken *two hundred and ninety-six* pounds of honey, inclusive of wax. This was a multiplied gathering, produced by one stock of Bees, and was taken not all at once but at several times during the honey harvest in the year 1826.*

Lord. Is that stock now living?

Nutt. It is, my Lord, and still prospering.

* The particulars of this extraordinary gathering will be found under the head—Thermometer, in the following work.

Lord. What remained in the hive for the Bees' support, after taking from them so large a quantity of honey?

Nutt. One hundred and nine pounds, my Lord.

Lord. Did the Bees consume that one hundred and nine pounds in the winter?

Nutt. No, my Lord, only about twelve pounds of it.

Lord. Do you mean to assert that the Bees began the following year with ninety-six pounds of store honey?

Nutt. I do, my Lord. And if any man wish to profit by the management of the honey Bee, it must be *by liberality*, and not by a stingy allowance to them during the winter.

Lord. Now, Mr. Nutt, do you think the cottager could be instructed to manage Bees on your system?

Nutt. I do, my Lord, would your Lordship and your acquaintances but press the necessity, not to say advantages, of such a mode of management amongst them.

Lord. It is a pleasing study certainly, and leads to a profitable result. I will with pleasure use my endeavours to promote the general adoption of your plans.

Nutt. Thank you, my Lord. I shall at all times be anxious to deserve your patronage by an industrious use of my practical knowledge, and ready on all occasions to give instructions gratis to the poor man who may wish to adopt my mode of management.

Lord. Pardon me for being so inquisitive, but it appears to me, that there are prodigious numbers of Bees in a hive: now can you retain and manage those numbers of Bees in your boxes?

Nutt. I have been asked this question many times, my Lord, and in answer to it, I will give your Lordship my explanation candidly, and as the circumstances of my practice have repeatedly demonstrated to me the fact.

As all the increase that takes place in a hive or box springs from the sacred body of the Queen, the powerful influence of ventilation, properly attended to, prevents the necessity of swarming. For when her majesty—the sovereign of the hive—has the interior temperature of her domicile properly regulated, and room sufficient afforded her to carry on her extensive work, another governor is not required. The Bees so managed and

accommodated repair to the royal cradle, seize the embryo nymph, excavate the royal cell, and soon bring out the lifeless corpse to the door of the apiary. Now had the intense heat of the hive forced the royal mother from her home, this royal larvæ would have remained stationary in the hive, and have partaken of the multiplying nature of her absent mother; and her mother would have departed and domiciled herself in another place. But as swarming is prevented by my humane regulation hive (if I may so call it), the sovereign in its infant state is discarded before it comes to maturity: by this means the procreation of a future Queen is retarded, nay, destroyed, and the reigning Queen becomes the absolute monarch of the hive.

Lord. Is it your opinion that the Queen Bee lives many years?

Nutt. I do know by my own experience that she lives more than four years: I do not believe she is long-lived.

Lord. Do you think the Queen always dies a natural death in the hive?

Nutt. I do not, my Lord. She is allowed to live only so long as she proves herself to be fertile: when she becomes barren, she, like

the drone Bee, is cast out as a useless member of the hive.

Lord. Are you of the opinion that the royal cell is always impregnated with the Queen species during the life time of the reigning monarch?

Nutt. I believe, my Lord, that no barren Queen ever is cast out of the hive without the existence of the royal embryo being within.

Lord. Have you ever proved Sichard's discovery satisfactorily to your own mind?

Nutt. I have, my Lord, and acknowledge it to be one of the grandest discoveries, and of the utmost importance to the skilful apiarian; for this move alone prevents the necessity of swarming.

Lord. Is it your opinion that the honey which Bees gather from flowers is deposited in the cells without material alteration in the honey?

Nutt. I am apt to think that the Bee makes no alteration in the honey, but collects this delicious syrup as nature produces it; and first fills her honey-bag, and then discharges it into the magazine or cells prepared and appropriated for its reception.

Lord. I am of your opinion in that particular, and could never observe that they are

able to condense the honey when it is too liquid. Perhaps it may be true, that when they receive it into their bodies, they purify and give it some consistence.

Nutt. The Bees certainly act with more regularity than ourselves, my Lord.

Lord. Yes—the hive is a school to which numbers of people ought to be sent. Prudence, industry, and benevolence, public spiritedness and diligence, economy, neatness, and temperance, are all visible among the Bees; or rather, let us say, they read us lectures upon these several subjects.

Nutt. As long as men are not influenced by the grace of God, they are certainly the most unjust and corrupt of all creatures.

Lord. I cannot repress my indignation, when I see to what prostitutions our species degrade themselves; especially when they are possessed with the fury of ambition, or when they are determined to live at ease, without giving themselves the least pain on seeing their fellow creatures barely possessed of food and raiment. But let us close this disagreeable subject; and though we find our manners condemned by the practice of these

little insects—the Bees—which associate with so much tranquillity and union, yet let us go on to make them the subject of our examinations; 'tis an article that infinitely delights me.

I have seen your glass-hives, which are exhibited at the National Repository, and I have been much pleased by your constant attention to your profession, if I may so term it. Your daily descanting upon your apiarian plans has at last made a convert of me to the admirable principles expounded in your daily lectures at that useful public institution. Persevere, then, in the cause of your humanity, and your late opponents will become your best friends.

Nutt. Can any one of those opponents, my Lord, particularly that wretch who three times within one year seized upon my apiary, to wrench from my hand the object of my studies, ever be my friend?

Lord. I think with you, that such a monster ought not to be countenanced: he is worthy of your censure, and in the end he will meet with his reward. But let us cease this disagreeable subject, and return to

the pleasing study of the commonwealth of Bees. Do you think the female Bee breeds her young by copulation?

Nutt. I do not, my Lord.

Lord. How is the generation brought about? Do you know that any other save the Queen Bee lays eggs?

Nutt. I am confident that not any of the different species, either drones or working Bees, lays eggs. The Queen only lays them.

Lord. If the Queen lays all the eggs of the hive, do not the drones fecundate them?

Nutt. On this subject various and contradictory have been the opinions and hypotheses of apiarians. Some of their extravagant systems have been adopted; and the whole force of human sagacity and invention has been called into play to discover this great secret in the works of nature; but, my Lord, after all these exertions, the same doubt still exists as at the commencement of the investigation. The English apiarians, Thorley, Varder, Wildman, Bonner, Keys, &c. have all had their different systems, and each has believed that he was the fortunate discoverer of the secret. The fact, however, is, as Mr. Huish states, and it is my opinion that the

Queen knows not coition; she is both virgin and mother; although this is denied by Reaumur and other apiarians, against the opinion of Maraldi, Swammerdam, and other celebrated naturalists.

Lord. Do you believe the drone is the male Bee?

Nutt. If there be a male Bee in the hive, the drone is the male Bee. But I have my doubts on this subject, and beg for some considerable time before I venture to answer this important question positively.

Lord. Have you this proof in operation?

Nutt. I have, my Lord, in my observatory hive.

Lord. Will your ingenious observatory hive, when well worked by an experienced apiarian, elucidate this grand secret?

Nutt. If plain and naked facts can give instruction, where every move of the Bees in their hive is exposed to the eye of the apiarian, it is my observatory hive that must give birth to further discoveries on this important subject. But whether I shall be the man, or some more skilful apiarian, that shall bring to light this mystery, time alone must determine. At all events, my observatory

hive gives me the satisfaction to think that I shall be instrumental in bringing to light this hidden mystery, if not the actual discoverer of it.

Lord. I believe the fact: for a more ingenious contrivance than your observatory hive for the studying of Bees never was put into operation by any other man save by yourself.

Nutt. My Lord, I thank you for the compliment.

Here the conversation was interrupted: here, therefore, my introduction closes.

CHAPTER II.
 WINTER SITUATION FOR BEES.

As the foregoing dialogue contains some remarks relative to a proper situation and aspect for Bees during the winter months; and as those remarks had reference to Bees in the common cottage or straw hives, rather than to those domiciled in boxes, it may not be amiss *here* to resume, and to go through, that part of my subject, before I enter the terra incognita of boxes, glasses, ventilation, thermometers, &c. and into the directions for the construction of some, and for the management of all these, and of all my Bee machinery.

The following detail, then, will show my readers the results of some experiments relative to the aspect and situation of Bee-hives during winter.

In 1824 I had six cottage-hives, which had prospered well with me during the summer of that year. In the autumn of the same year I resolved to weigh those six hives, and to place three of them on the north side of my house, and to let the other three remain in their summer situation. The separate weights of my hives, in November of the year 1824 were as under, viz.

No. 1. 35 lbs.	No. 4. 42 lbs.
2. 38 —	5. 32 —
3. 40 —	6. 37 —
<hr/>	<hr/>
113	111
<hr/>	<hr/>

The first three of these Nos. viz. 1, 2, and 3, weighing together 113 lbs. remained during the winter in their summer situation: Nos. 4, 5, and 6, weighing together 111 lbs. were removed to a cold, dry place on the north side of my house. On the 26th of March, 1825, I again weighed those six hives, and found their respective weights to be as follows, viz.

No. 1. 15 lbs.	No. 4. 37 lbs.
2. 16 —	5. 27 —
3. 19 —	6. 32 —
<hr/>	<hr/>
50	96
<hr/>	<hr/>

So that the three hives remaining in their summer quarters during the winter had decreased in weight just 63 lbs. being on an average 21 lbs. each; while the three which had wintered on the north side of my house had decreased only 15 lbs. being on an average only 5 lbs. each. This gives an average difference of 16 lbs. a hive, between a proper and an improper winter situation and aspect for Bees. It is lamentable to think how many people lose their Bees, either from ignorance, prejudice, or want of attention to this particular point—a *proper winter situation*.

I need scarcely relate to my readers, that the Bees which were placed fronting, or open to the north, were the first that swarmed the next spring. They swarmed in the month of May; while those hives that had remained fronting, or open to the south, did not swarm until July; and one hive (No. 2.) never swarmed at all during the season. At the latter end of October, 1825, I again weighed my hives, and found them to be as under:—

No. 1.,	.28 lbs.	Swarm from ditto	10 lbs.
— 2.,	.22 —	— 3.,	.30 —
— 3.,	.30 —	Swarm from ditto	14 —
	80		24

No. 4...	44 lbs.	Swarm from ditto	32 lbs.
5...	43 —	Swarm from ditto	28 —
6...	41 —	Swarm from ditto	30 —
	<u>128</u>		<u>90</u>

Hence it appears that the three hives (Nos. 1, 2, and 3) that had never been removed from their summer stands, were 33 lbs. lighter than when I first weighed them, that is, on an average, 11 lbs. a hive; and even with the weight of their two swarms added to them, there was a falling off in the year of 9 lbs. or, on an average, of 3 lbs. a hive: whilst Nos. 4, 5, and 6, had gained 17 lbs. or, on an average, nearly 6 lbs. each; and with the weight of their swarms added to them, they had gained 107 lbs. or, on an average, nearly 36 lbs. a hive in the year.

I could carry this subject much further in my explanations, as I did in my experiments, but it requires no facts in addition to those just stated to explain the difference of aspect in the winter-season to Bees.

Every cottager must know that the richer his Bees are in spring, the sooner they will swarm. Then, to make them rich, he must

not neglect to place his hives out of the influence of the sun during winter,—*in a dry, cold, and quiet situation*. He will find by this practice, that not more than five or six pounds of honey will be consumed by a good stock; but if he suffer his Bees to remain fronting the south, they will in a mild winter, if they survive it at all, become paupers before spring.

CHAPTER III.

BEE-BOXES AND MANAGEMENT OF BEES
IN THEM.

THE schemes and contrivances, and ways and means, to which apiarians have had recourse, in order to deprive Bees of their honey, without at the same time destroying their lives, have been various, and some of them ingenious; but hitherto not one of them has been crowned with the desired success. The leaf-hives of Dunbar and of Huber,—Huish's hive with cross-bars,—the piling of hive upon hive, or box upon box, (called storifying), and several other contrivances, have all had this great object in view,—have all had their patrons and admirers,—have all had fair trials,—but have, notwithstanding, all failed of fully accomplishing it.

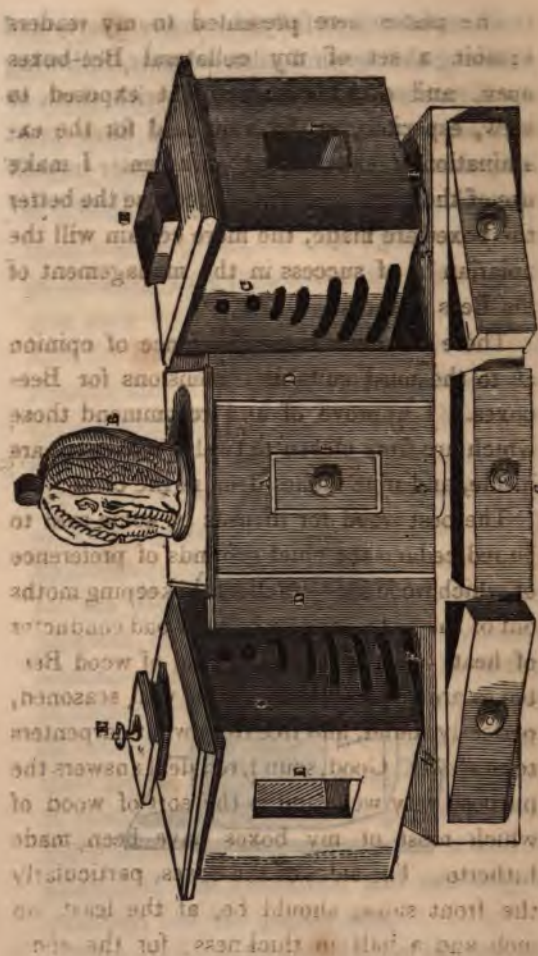
Whether my inventions may merit and may meet with a similar or with a better fate, it is

not for me to predict;—time will show. I feel warranted, however, in asserting of my COLLATERAL BOX-HIVE, which I am now about to explain,—of my INVERTED HIVE, and of my OBSERVATORY HIVE, of which in their proper places minute descriptions will be given,—I feel, I say, warranted in asserting that these—my inventions—possess such conveniences and accommodations both for Bees and Bee-masters, that the pure treasure stored in them by those industrious little insects may at any time be abstracted from them, not only without destroying the Bees, but without injuring them in the least, or even incommoding their labours by the operation;—that they afford accommodations to the Bees which greatly accelerate the progress of their labours in the summer-season;—and that the Bees never leave them in disgust, as it were, as they not unfrequently *do leave* other hives, after being deprived of their stores; but, as if nothing had happened to them, continue day by day to accumulate fresh treasures, the quantity of which has astonished the beholders, and not only the quantity, but the quality also.

That my boxes do not admit of improvement is more than I assert; but having worked

them most successfully for many years, and knowing that several other persons, following my directions, have succeeded with them as well as myself, and far beyond their most sanguine expectations, I do flatter myself that the principle of managing Bees after my plan is right.





The plates here presented to my readers exhibit a set of my collateral Bee-boxes open, and every compartment exposed to view, especially to the view and for the examination of experienced workmen. I make use of the word *experienced*, because the better the boxes are made, the more certain will the apiarian be of success in the management of his Bees in them.

There has been some difference of opinion as to the most suitable dimensions for Bee-boxes. I approve of and recommend those which are from eleven to twelve inches square inside, and nine inches deep in the clear.

The best wood for them is by some said to be red cedar; the chief grounds of preference of which wood are—its effects in keeping moths out of the boxes, and its being a bad conductor of heat. But of whatever kind of wood Bee-boxes are made, it should be well seasoned, perfectly sound, and free from what carpenters term *shakes*. Good, sound, red deal answers the purpose very well, and is the sort of wood of which most of my boxes have been made hitherto. The sides of the boxes, particularly the front sides, should be, at the least, an inch and a half in thickness; for the ends,

top, and back-part, good deal one inch thick will do; the ends, that form the interior divisions and openings, must be of half-inch stuff, well dressed off, so that, when the boxes and the dividing tins are closed, that is, when they are all placed together, the two adjoining ends should not exceed five-eighths of an inch in thickness. These communication-ends, the bars of which should be exactly parallel with each other, form a communication, or a division, as the case may require, which is very important to the Bees, and by which the said boxes can be immediately divided without injuring any part of the combs, or deluging the Bees with the liquid honey, which so frequently annoys them, by extracting their sweets from the piled or storified boxes.

This is not the only advantage my boxes possess: the receptacles or frame-work for the ventilators, which appear upon each of the end-boxes,—the one with the cover off, the other with it on—must be four inches square, with a perforated, flat tin of nearly the same size, and in the middle of that tin must be a round hole, an inch in diameter, to admit the perforated, cylinder, tin ventilator, nine inches

long. This flat tin must have a smooth piece of wood well-made to fit it close, and to cover the frame-work just mentioned, so as to carry the wet off it, then placing this cover over the square, perforated tin, your box is secure from the action of wind or rain.

We next come to the long floor, on which the three square Bee-boxes (A. C. C.), which constitute *a set*, stand collaterally. This floor is the strong top of a long, shallow box, made for the express purpose of supporting the three Bee-boxes, and must, of course, be superficially of just such dimensions as those boxes, when placed collaterally, require; or, if the Bee-boxes project the eighth part of an inch over the ends and back of this floor-box, so much the better; because in that case the rain or wet, that may at any time fall upon them, will drain off completely. For ornament, as much as for use, this floor is made to project about two inches in front; but this projection must be sloped, or made an inclined plane, so as to carry off the wet from the front of the boxes. In depth, this floor-box, measured from outside to outside, should be four inches, so that, if made of three-fourths inch deal, there may be left for the depth of

the box-part full two inches and a half. Internally it is divided into three equal compartments, being one for each Bee-box: admission to these compartments, or under-boxes, is by the drawer and drawer-fronts, or blocks, which will be described presently.

It is quite necessary that the boxes (A. C. C.) should stand perfectly air-tight upon the aforesaid floor. In the floor-board are made three small openings, i. e. one near the back of each box. These openings are of a semi-lunar shape, the straight side of which should not be above three inches in length. They are covered by perforated, or by close tins, as the circumstances of your apiary may require. The drawer (G.) which appears under the middle box, is of great importance, because it affords one of the greatest accommodations to the Bees in the boxes. In this drawer is placed, if necessity require it, a tin made to fit it, and in that tin, another thin frame covered with book-muslin, or fine strainering, which floats on the liquid deposited for the real necessities of the Bees. Here, then, you have a feeder, containing the prepared sweet, in the immediate vicinity of the mother-hive, and without admitting the cold or the robbers to

be admitted to the boxes.

annoy the Bees. When you close the drawer thus prepared, you must draw out the tin placed over the semi-lunar aperture, which opens to the Bees a way to their food in the drawer. The heat of the hive follows the Bees into the feeding apartment, which soon becomes the temperature of their native hive. Here the Bees banquet on the proffered boon in the utmost security, and in the temperature of their own domicile. Under such favourable circumstances it is an idle excuse, not to say—a want of humanity, to suffer your Bees to die for want of attention only.

I now come to notice the use of the block-fronts on each side of the feeding drawer, marked G. These two block-fronts, when shut close up, answer many good purposes, and afford the apiarian ready access to the most profound interests of the commonwealth: first, in the facility they afford of adding numbers to the establishment, as occasion may require, which is done without the least inconvenience or trouble to the apiarian, and without the least resentment from the native Bees; second, in affording to the Bees a place of egress when you are about to take from them one of the end boxes; third, in the effectual and beautiful guard they furnish

against robbers: these blocks, these moveable blocks, are so contrived that ten thousand Bees can with ease leave their prison and their sweets in the possession of the humane apiarian, without the possible chance of a single intruder forcing its entrance to rob the magazine or to annoy the apiarian. Perhaps this is the most pleasing part, and the most happy convenience attached to the boxes. Lastly, I have to notice the security which the under-box or frame gives to the stability of the three upper boxes,—the firmness with which it supports them,—and the dry and comfortable way in which the Bees by it are enabled to discharge their dead, and other superfluities of the colony, without their being exposed to the cold atmosphere of an autumn or a spring morning.

The octagon-box, marked H, is a covering for the bell-glass, marked B, which is placed on the middle box, or seat of nature. It matters not of what shape this covering is, because any covering over the glass will answer the same purpose, provided the under-board of it is wide enough to cover the divisional openings, and to throw off the wet. I choose an octagon because of the neatness of its appearance.

In endeavouring to recommend these Bee-boxes as worthy of general adoption, in order to succeed in my object, it is undoubtedly necessary that the parts and construction of them, and of every thing pertaining to them, be fully explained and clearly understood: I therefore proceed to give another view of them.

In the former plate they are exhibited as open, or detached and apart from each other: in the following one they are represented as closed and standing together, as when stocked with Bees, and in full operation in an apiary.



A. is the pavilion, or middle-box, which may be most easily stocked by a swarm of Bees, just as a cottage-hive is stocked.

B. is the bell-glass in the first plate,—in the second, it only points to the place where the glass stands.

C. C. are the collateral, or two end-boxes.

D. D. are neat mouldings, about three inches wide, made of three-fourths-inch deal, and are so fastened to the middle-box in front, as well as at the back, that an inch and a half of each may project beyond each corner of that box, and form a cover and protection for the edges of the dividing-tins, and also for the four seams, or joints, necessarily made by placing the end-boxes against the middle one.

E. E. are the frame-work and covers of the ventilation.

F. F. are the block-fronts	} already described.
G. is the feeding-drawer	
H. is the octagon-cover	

I. I. I. are the window-shutters, which open as so many little doors by means of small brass-joints, and are kept fast, when closed, by a brass-button set on the box.

1, 2, 3, 4, are so many tin slides, to cut off, or to open, as the case may require, the communications between the pavilion and the

bell-glass, between the pavilion and the feeding drawer, and between the end-boxes and their under-boxes.

For a Bee-passage between the pavilion and the bell-glass, is cut, in the centre of the top of the pavilion, a circular hole, an inch in diameter, and from the edge of that circular hole are cut four or six passages, just wide enough to allow the Bees space to pass and re-pass. These lineal cuts must of course terminate within the circumference of the circle formed by the edge of the bell-glass that is placed over them.*

Perhaps it may be said,—in fact, it has been said—that these boxes are in reality nothing more than a common cottage-hive. Be it so: but it is an *improved* cottage-hive, made convenient by being divisible, and by having its parts well-arranged. The middle-box, or department, marked A, is, however, square, and not round, like the common straw-hive. In this middle-box the Bees are to be first placed; in it they first construct their beautiful

* In the preceding plate the engraver has made the floor-box to project or extend beyond the ends of the C. C. boxes; but, as has already been observed, it is better if made so that those boxes project a little over the ends and back of the floor.

combs,—and, under the prerogative of one sovereign and mother of them all, carry on their matchless labours, and display their astonishing ingenuity. In this box the regina of the colony, surrounded by her harmonious, cleanly, industrious, skilful subjects, carries on her part of procreation, and finally hatches her numerous progeny, called by Bee-masters the larvæ. It is at this time that my collateral boxes are of the utmost importance to the Bees domiciled in them: for when the young larvæ are perfected upon the cottage plan, a swarm is the necessary consequence. The Queen, with thousands of her Bee-subjects, leaves the colony, and seeks another place in which to carry on her astonishing labours. But as swarming can be prevented, it is manifestly a good thing to do so; for the time necessarily required to establish another colony, even supposing the cottager succeeds in saving the swarm, would otherwise be employed in collecting the pure sweets, and in enriching the old hive. Here, then, is seen one of the advantages of my plan. When symptoms of swarming present themselves, and which are known by an unusual noise in the hive or box (for it is of Bees in boxes that I am now

treating) and by a general busy appearance among the Bees; when these symptoms are apparent, then the Bee-master may conclude that more space is required. At this period, therefore, he should draw out the sliding-tin, marked 1, from under the bell-glass, which simple operation will immediately open to the Bees a new room—a palace—which they will adorn, and fill with their sweets as pure as the crystal stream. But if by mistake the manager should draw up either of the collateral slides, the Bees will then refuse to go up into the glass, and will continue their works in the collateral-box in preference to the elevated glass; so well aware are these matchless insects of the inconvenience attending the carrying of their treasures into an upper room, when a more convenient store-house is to be had in a lower one. The natural movements of the Bees have demonstrated to me this fact by more than a thousand trials: year after year I have made this experiment to my entire satisfaction. The natural movements of the Bees also suggested to me the idea of the utility of ventilation, and that by its powerful influence their works might be both divided and purified; and that a place

of safety might still be preserved for the Queen in the pavilion. She wants a certain situation in which to carry on the work of propagating her species. Like the fowls of the air, she will not, if she can avoid it, propagate her young whilst under the observation and influence of man: she, therefore, prefers the middle-box for her work of propagation, as well on account of its privacy, as because the ventilation of the end-boxes so cools their temperature, that they are not the situation nature requires to bring the young larvæ to perfection; yet they can be kept at such a temperature as to make them desirable store-rooms for their treasures. By this mode of management we prevent the necessity of swarming; and behold the grandest chemists in the world, and stores after stores of their pure treasure, unadulterated by the necessary gathering of immense quantities of farina for the young larvæ, which we see in the piling system, as well as in the common cottage-hive; but this is all carried into the immediate vicinity of the seat of nature, the place where it is wanted.

When the glass is nearly filled, which in a good season will be in a very short space of

time, the Bees will again want accommodation. Previously, however, to drawing up the tin-slide to enlarge their crowded house, the manager should take off the empty end-box he intends to open to them, and smear or dress the inside of it with a little liquid honey. Thus prepared, he must return the box to its proper situation, and then withdraw the sliding-tin between it and the pavilion, or middle-box, and thereby in a moment enlarge the Bees' dominion, and produce the greatest harmony in the hive. The Bees will immediately commence their operations in their new apartment. Thus swarming is effectually prevented; and thus the Queen gains a vast addition to her dominions, and consequently additional space for the population of her momentarily enlarged domicile. There is now no want of store-house room, nor of employment, for our indefatigable labourers. And while the subjects are employed in collecting, and manufacturing (if I may so say) their various materials, the regina is engaged in carrying on the great, first principle of nature—the propagation of her species. This she does in the department (A.) filling with her eggs the cells which have been vacated by the young larvæ.

When, however, her next new progeny are about to be brought into life, the Bee-master must draw out another tin-slide, and thereby open a communication to another empty apartment, and so make a further addition to the Queen's realm; which the new, and even veteran, labourers will instantly occupy, and set about improving and enriching their enlarged commonwealth. No sooner have the Bees finished their operations in the several compartments of their box-hive, which may be ascertained by looking through the little windows at the back and ends of the boxes, than the Bee-master gently puts in the tin-slide (1.) lifts up the lid of the octagon-box or cover (H.) and takes off the bell-glass, filled with the purest and most perfect honey. Before, however, he endeavours to take away the glass, it is quite necessary that he should cut through between the bell-glass and the box, with a fine wire, in order that the tin may the more easily slide under the full glass of honey; when this is done, he may take off the full glass and replace it with an empty one. He must then draw out the tin-slide (1.) and so on for ever.

The operation of taking off a glass, or a box, of honey, may be best performed in the

middle of a fine, sunny day; and in taking off a glass, the operator, having put in the tin-slide (1.) as already directed, should wait a few minutes, to see whether the Bees made prisoners in the glass manifest any symptoms of uneasiness; because, if they do not, it may be concluded that the Queen-bee is amongst them; and in that case it is advisable to withdraw the slide (1.) and to re-commence the operation another day. But if, as it generally happens, the prisoners in the glass should run about in confusion and restlessness, and manifest signs of great uneasiness, *then* the operator may conclude that all is right, and, having taken off the octagon-cover, may envelope the glass in a silk handkerchief, or dark cloth, so as to exclude the light, remove it with a steady hand, and place it on one side, or so that the Bees may have egress from it, in some shady place, ten or fifteen yards from the boxes, and the Bees that were imprisoned in it will in a very few minutes effect their escape, and return with eagerness to the pavilion and their comrades.

And what may be done with B, may also be done with either of the C. C. boxes, as occasion requires. It may not, however, be

amiss to be more explanatory of the mode of taking away the treasures of the Bees in the side-boxes. It will be necessary to examine minutely the state of your boxes, particularly when the whole of your colony is full of the Bees' works. When the tin is put down to divide an end-box from the mother-hive, you, no doubt, make many prisoners; to prevent which, the night before separating an end-box from a middle one, lay open the ventilators, which will not only lower the heat of the box, but will admit the atmospheric air, which naturally causes the Bees to leave that apartment, and to draw themselves into the middle-box—their native climate; when this is done, you may put down the tin-slide (D.) as already directed, and let your Bees remain about fifteen minutes in total darkness: then open the windows of the box you are about to take off, and if the Queen-bee is not within that box, the Bees that are in it will show a great desire to be liberated from their disagreeable confinement. But should the Queen-bee be there, you will then find the Bees show no desire to leave her;—the commotion will appear in the middle-box. Under such circumstances, which sometimes happen, you

must act with caution; for were you to open the egress from the box, that is, the block (F.) and tin-slide (2. or 4. as the case may be) to permit their departure, very shortly would the whole of the working Bees join their sovereign in the box you intended to take; and this would be a great disappointment and complete puzzle to the Bee-master, not thoroughly acquainted with the moves of, or proper mode of managing, his valuable hive. To me such an occurrence would be a repetition only of a demonstration of facts—of pleasures unspeakable, in beholding the grand works of nature, the noble influence of her majesty—the Queen of the Bees.

When, however, you do find the Queen in the box you are about to take off, is it not easy to draw the tin-slide up again? Certainly it is easy to draw up the dividing-tin. Do so, then, and that done, the Queen-bee will readily embrace the opportunity of leaving the place of her confinement; and then you will have accomplished your object. You will soon see the Bees running to and fro upon the windows in the box you are about to take off, and when you thus find them anxious to leave your box of honey, close the windows, and you have

then only to open an egress by withdrawing the tin, No. 2. or 4. as your box may require; the Bees finding an aperture, with light to direct their departure, will immediately embrace the opportunity of regaining their liberty, will fly away from their prison, and join their fellow-labourers at the entrance of the mother-hive. In a few minutes you will be in possession of a box of honey, and all your Bees will be in safety, harmonising with their beloved parent—the Queen of the hive. Take from them the box your humanity entitles you to, minding that the tin-slide is safe to the middle-box. You will then empty the full box, and return it empty to its former place; then draw up your tin, and you again enlarge their domicile, having gained a rich reward for your operation, at the expense of their labour. A child of twelve years of age may be taught to do this without the least danger; there need no Bee-dresses,—there needs no fumigation of any sort. It is a natural movement for the welfare of these worthies, that prevents their swarming, and at once secures to the sovereign Queen of Bees her rightful throne. Reader, this declaration is founded on facts,—on the practical experience of many years. And that you may

adopt this principle and mode of managing honey Bees, that is, of taking their superfluous treasure, and preserving your Bees uninjured, and, if you can contrive it, improve upon the instructions here given you, and upon the example here set you, is my hearty wish, for my country's welfare, and for the welfare of my admired, nay, of my *beloved*, BEES.

Should it, however, so happen, as it sometimes may, owing to a variety of causes, such, for instance, as the negligence, or unskilfulness, or unavoidable absence of the Bee-master, at a critical time, or from any other cause, should it, I say, so happen, that the pavilion, or middle-box, should swarm, take such swarm into one of the end-boxes, prepared for such an event, by merely making an entrance to it, at or as near as possible to the corner farthest from the entrance into the middle-box; and before this new entrance fix a small lighting-board. The swarm will thus become a family of itself, and as much a stock *pro tempore*, as if it were placed on a separate stand, provided the dividing-tin, which separates the middle-box from that in which the swarm is put, be carefully adjusted, and made perfectly tight and secure, so that a Bee cannot pass from

one box to the other. To this material point the apiarian will necessarily attend when he first removes the end-box in order to put the swarm into it. In the evening place the box containing the swarm on its floor, just where and as it was before it was taken off. Let the Bees thus managed work two or three weeks, or as the nature of the season may require,—I mean—until the end-box appears to be pretty well filled with combs. Then close up the exterior entrance of the collateral-box containing the swarm of Bees, and draw out the sliding-tin which hitherto has separated the two families or colonies, and the Bees will unite, and become one family. The apiarian will likewise witness with pleasure the true effect of ventilation in the hive; for as soon as the Bees have deposed one of the Queens, and the end-box has been cooled by means of the cylinder-ventilator, he will discover that the combs will be presently emptied of every material necessary for the support of the young larvæ; so that the combs, that had been so recently constructed for a seat of nature, soon become receptacles for pure honey, and the numerous Bees become the subjects of one sovereign in the middle-box.

Before I further explain the nature of my collateral Bee-boxes, I shall briefly express my desire that my readers will attend particularly to the discovery of the effects of ventilation. I have been asked—"Of what use is ventilation in the domicile of Bees?" I answer—one of its uses has already been described, and much more of its use, I may say, of its necessity, in the humane management of Bees will be told presently. Many treatises on the management of these valuable insects have appeared in language of eloquence, and with feelings that do honour to their authors.

To works of Nature join the works of man,
To show, by art improved, what Nature can.
Nature's great efforts can no further tend,
Here fix'd her pillars, all her labours end.

DRYDEN.

Perhaps the divided labour of the honey Bees was anticipated by the author of these lines: but, be that as it might, I, in my turn, will ask—How can we preserve the Bees uninjured, and divide their works, without the influence of ventilation? I think it is impossible. A lesson, a true lesson, from nature, has demonstrated this fact to me, and ten years' constant labour and attention to this important subject have put into operation

my plans for the welfare of that wonderful insect—the sovereign Queen of Bees. Well might Dr. Bevan say—

First of the throng, and foremost of the whole,
One stands confess'd the sovereign and the soul.

Curious facts respecting this extraordinary creature are before me, which have been ascertained and proved by means of my observatory-hive. This hive is unknown in any theory hitherto advanced on the interesting subject of Bee-management: and with reference to it I may observe—that when a new principle is discovered by studying nature, such principle will seldom fail to produce effects beneficial in proportion to its being understood and skilfully applied. So simple and so rational (if I may so say) is my observatory-hive, that it cannot but be approved, when it is once understood, by the followers of my apiarian practice. Be my humble theory what it may, it hath truth for its foundation; and by perseverance and industry I flatter myself I shall materially improve, if not bring to perfection, the cultivation and management of honey Bees, merely by pointing out *how* the produce of their labour may be divided, and *how* their lives may be preserved notwithstanding.

Much has been said against the probable results of this practice: but facts are stubborn things; and he that has trampled upon my humane endeavours, and disdained my predictions relative to this subject, will be taught to tremble before Him who gave the light to such an humble individual as myself. I claim not the merit. It is my wish that it should be attributed to Him who gave it.

The first movement in my apiarian practice commences with the pavilion of nature. This pavilion, which is equivalent to a cottage-hive, is the subject of my present observations and explanation.

I say, then,—disturb not this hive—this pavilion of nature: weaken not its population; but support its influence, and extend to it those accommodations which no practice, except my own, has yet put into operation, or made any adequate provision for. This humane practice partakes not of the driving, nor of the fumigating, nor of the robbing system. It is a liberal principle of Bee-cultivation, founded on humanity. And it is by such practice that we must be benefited, if we hope to succeed in the culture of honey Bees.

CHAPTER IV.

VENTILATION.

To ascertain the degree of heat in a colony of Bees, and to regulate it by means of ventilation, as circumstances may require, recourse must be had to the use of the thermometer; as will be explained presently. But here I would ask my worthy Bee-keepers; whether, in the course of their experience, they have at any time beheld a honey-comb suspended beneath the pedestal of any of their hives—a circumstance that not unfrequently occurs under old stools? The beautiful appearance of a comb suspended in such a situation is, as it were, the very finger of Providence, pointing out the effects of ventilation, and teaching us by an example the necessity there is for it in a crowded, busy hive. Behold the purity of such a comb; examine the cause of that

purity, and you will find that it is owing—solely and undoubtedly owing—to the powerful influence of VENTILATION.

An occurrence of this description, I mean—the discovery of a beautiful comb suspended, as just described, having excited my curiosity and my admiration, led me to inquire into the cause of it, and to study to discover, if by any means I could, why those skilful little creatures—the Bees—should construct their combs in such a situation. My observations soon satisfied me that one of these two causes, viz. either a want of room in the hive,—or a disagreeable and oppressive heat in it,—or, most probably, a combination of these two causes rendered it necessary for them, if they continued working at all, to carry on their work in that singular manner. My next step was to endeavour to prove the truth of my reasonings and conclusions, in which, I flatter myself, I have fully succeeded, after no inconsiderable labour and many contrivances to accommodate the Bees with additional room, as they may have occasion for it, and after repeated experiments to keep such room, when added, at a comfortable temperature for them by means of ventilation. In short, my

COLLATERAL BOXES and VENTILATION are the results of my studies and experiments on this point.

There are few persons, who are managers of honey Bees under the old hive system, who, if they have not seen a comb constructed and suspended in the manner just described, have not, however, beheld these unhappy little creatures clustering and hanging at the door of their hive in a ball frequently as large as a man's head, and sometimes covering all the front part of it, for sixteen or twenty days together; and this, be it remarked, at the season of the year which is the most profitable for their labours in the fields and among the flowers. During this great distress of the Bees in, or belonging to, such a hive, all their labour is of necessity suspended. And—why?—Because they want an enlargement of their domicile,—an extension of the power, and of the territory of their Queen; by which enlargement swarming is superseded, and the royal insect keeps her throne, extends her works of nature, and increases the labours of her subjects. This accommodation is provided for Bees in my collateral-boxes.

Ancient as well as modern Bee-keepers have frequently adopted the plan of eking, that is—placing three or four rounds (called an eke) under their hives. This method of enlarging a hive does in many instances prevent swarming during the first season. Notwithstanding, from all that I can see in it, it tends only to put off the evil day, and to accumulate greater numbers for destruction the following year. This is certain, because on minute examination of the pavilion of nature, we see an increase of wealth, as well as an increase of numbers in the state; but there is no provision or contrivance in the common hive for dividing the produce of the labours of those numbers: eking will not do it,—eking enlarges the hive, and that is all it does; consequently to get at their honey, the necessity for destroying the Bees follows, and the suffocating fumes of brimstone at length bring these worthies to the ground—to the unwelcome pit in which they are buried, and are, alas, no more! a few minutes close the existence of thousands that had laboured for their ungrateful masters; and their once happy domicile becomes a scene of murder, of plunder, and of devastation, which is a disgrace to Bee-masters,

and ought by all means to be discountenanced and discontinued. Assuredly Bees are given to us by the gracious Giver of all good things for a better purpose. Are we not commanded by the sacred writings to go to the Bee and to the ant, and learn wisdom? We are not told, neither are we warranted, by this language, to go and destroy the works of nature,—to disobey the commands of our Lord and Maker, who has given Bees to us for our edification and comfort, and not wantonly to commit a species of murder, in order to procure their delicious treasure. Nor is there the slightest necessity for destroying Bees in this cruel manner, when a single act of humanity will obtain for us their purest honey, and in a few minutes secure to us their valuable lives for future labours. Surely, then, an act of humanity to Bees cannot be displeasing to any one, especially when we are taught by the beneficial results of our experience, that their lives *may be preserved*, and their labours for us thereby continued.

Apiarian reader, take this subject into thy serious consideration: in the busy hive behold the noble works of God's creatures—the Bees: misuse not, then, the works of his hands;

but improve upon this lesson from nature; and for a moment pause before thou lightest the deadly match,—before thou appliest it with murderous intent to the congregated thousands in thy hive.

It's he who feels no reverence for God's sacred name,
Who lights the sulphur up to cause the dreadful flame.

Alas! I think I view the monster's busy hand,
Taking the dreadful match, a murderer stand.

These insects' indefatigable labours alone should soften our feelings, and induce us to spare their lives, for the rich treasures which they first collect, and then yield up to us by the influence of ventilation.

Why should we lay the axe to the root of the tree that produces such good fruit? Rather let us gather from its pure branches, and let the root live. Examine the nature and effects of my Bee-machinery, and you will discover its utility and its value in the management of Bees. By a single touch of that machinery you may instantaneously divide the treasures of the Bees, even in the most vigorous part of their gathering season, without the least danger to the operator. Is not this, then, a rational practice?—I trust it wants only to be properly understood in order to be universally adopted.

Again: Does not she that is a kind mother know the wants and desires of her children? Take the lovely offspring from its mother's care and protection, and imprison it before her eyes, and will she not impatiently cry aloud for its release and restoration to liberty? and will not the child's screams show its affection for its loving parent? and when its liberty is restored, does not consolation quickly follow? The lost child being once more under its mother's care, both mother and child are happy. Similar facts are exemplified by the mother of the hive, who loves her multitudinous offspring, and lives in harmony and affection with them. She evidently dislikes a separation from her subjects, who love her in return. And when they are divided only for a few minutes, we witness their sorrow, and hear the lamentations of the hive,—the mother calling for her children, anxious on their part to be released; and as soon as an opportunity is afforded them of effecting their escape, they embrace it,—the moment they feel their liberty, they gladly take advantage of it, and return to the pavilion in multitudes, so that in a short time tranquillity is restored, and peace and happiness are enjoyed by the

previously unhappy mother of the hive,—her subjects crowd round her, and the place that had lately been their prison becomes their palace, and a magazine of treasure, which the humane apiarian is entitled to.

Much has been said on the piling or storing mode of managing Bees; and I admit that there are advantages in it that we do not meet with in the cottage-hive system. It is, notwithstanding, imperfect in the design,—it is founded in error,—in practice it is liable to many difficulties,—and it is particularly disadvantageous to the labours of these valuable insects.

We have only to study the nature and habits of Bees, and to watch particularly the desires of these indefatigable creatures. They alone will teach us the lesson. But follow them through their movements during a summer's day, and you will behold them, as it were, pitifully asking for the assistance of man, according to the varying state of the thermometer.

CHAPTER V.

THERMOMETER.

As I have been frequently asked to explain the utility of ventilation in a hive or colony of Bees, so have I as frequently been asked, sometimes with civility and politeness, sometimes jeeringly and in contempt,—“What has the thermometer to do with Bees?” I answer—We shall see presently; and, I trust, see enough to convince the veriest sceptic on the subject, that the thermometer is an instrument that is indispensably necessary in the management of Bees according to my plan. Such inquirers might as reasonably ask what the mainspring of a watch has to do with the movements of that machine? Without the mainspring the watch would not work at all; and without the thermometer we cannot ascertain with any degree of accuracy

the interior temperature of the hive; which is of the utmost consequence in the humane management of honey Bees. The thermometer is the safest, if not the sole guide to a scientific knowledge of their state and works. To ventilate an apiary or colony of Bees, when their interior temperature is under 60 degrees, is ruinous to them,—is contrary to their natural labours. From upwards of fifteen hundred observations in the summer of 1825, I am fully satisfied on this point. Their nature is to encourage that heat by their indefatigable labours; and as the temperature rises, so does it invigorate and encourage an increase of population, as well as an increase of their treasured sweets. As the hive fills, so will the thermometer rise to 120 and even to 130 degrees, before these worthies will leave their wealthy home. When the thermometer is at the above height, these wealthy colonists will have arrived at the highest state of perfection,—wealthy indeed, every store-house being filled nearly to suffocation with their abundant treasures, and they, as it were, petitioning the observer of their too-limited store-house for a fresh room. Then give them a fresh room,—accommodate them with

such a store-house as my collateral-boxes will and are intended to afford them. Suffer them not to swarm: an emigration from a prosperous colony of half its population cannot fail of being very disadvantageous both to those that emigrate, who must necessarily be poor, and to those that remain, be they ever so industrious, or ever so wealthy.

When you discover your thermometer changing rapidly, and, instead of standing, as it generally does, at about 80 degrees; rising in a few hours perhaps to 90, you may conclude that ventilation is then highly necessary. The more you ventilate, when their temperature gets to this height, the more you increase the Bees' labour; for when they find a comfortable temperature within, they enjoy it, and will proceed to fill every vacant comb.

Nature has provided the Queen of Bees with the power of multiplying her species, and of providing against any casualty which in so numerous a state may frequently happen. That all-seeing Providence—that omnipotent Deity—our Maker, has doubtless long beheld the shameful neglect of man, which alone is the cause of the distress of the hive, and which

forces it to swarm. Let man, then, remedy the distress and mischief which he occasions *by preventing it*. It is the Queen-bee that emigrates; were she not to lead, none would lead, nor would any follow, to seek and to settle in some place more congenial to them than an over-heated, over-stocked, though rich hive. She well knows she cannot live in a state subjected to a suffocating heat, amidst an overgrown population. So she leaves the royal cradle, impregnated with the royal larvæ, and withdraws from the hive, reluctantly, one may suppose, though accompanied by thousands of her subjects. The Queen-bee leads the swarm to seek a place of comfort, and to establish another home, where not one cell nor drop of honey exists.

To establish the truth of these assertions, and to prove the practical utility of ventilation and of the thermometer in the management of Bees, I will now give my reader an account of some interesting experiments that I made in 1826, and then add a few extracts from my thermometrical journal of that summer, which in fact guided me in those experiments, for without the assistance of my thermometer I should never have made them; from which,

taken together, it will, I think, be sufficiently evident that ventilation and the thermometer are highly necessary,—are alike important,—in short, are *indispensable* in the humane management of honey Bees.

On the 26th of June 1826, I suffered a colony of Bees to swarm, in order to prove the truth of the foregoing statements. It was a very fine colony: the thermometer had been standing at 110 for six days previously, in the collateral end-box; on the eighth day it rose suddenly to 120. I was then forcing my Bees to leave their home; I could have lowered their temperature, and by so doing have retained my worthies in their native boxes: but I was then about to prove a fact of the greatest moment to apiarians. On the ninth day, at half-past twelve o'clock, the finest swarm I ever beheld towered above my head, and literally darkened the atmosphere in the front of my apiary. After remaining about five minutes in the open air, the Queen perched herself upon a tree in my garden, where she was exposed to the scorching rays of the sun; but her loyal subjects quickly surrounded her, and screened her from its influence. I immediately assisted my grand prize by

hanging a sheet before them to ward off the intense heat of the sun. I allowed the Bees to hang in this situation until the evening. During the absence of the swarm from the colony, my full employment was to watch the movements of the parent-stock, in order that I might in the evening return this beautiful swarm to their native palace, which they had been forced to leave. Curiosity and a desire to solve a doubtful problem, for the good of my fellow creatures, led me to act as already related, at the expense of much inconvenience to the Bees. The remaining honey Bees continued labouring during the day that the fine swarm left them; and in the evening of the same day, the thermometer was standing at 90 degrees in the old stock; so that the absence of the swarm had lowered the temperature of the pavilion 30 degrees, and I was quite sure I could reduce it in the collateral end-box to that of the exterior atmosphere, which was only 65.

To effect this, I resolved at once to take off a fine top-glass filled with honey. I did so: its weight was fourteen pounds. This operation reduced the interior heat of the colony to 75. But looking at my grand swarm, and

intent as I was upon uniting it to the parent-stock, I thought it impossible for the vacant space conveniently to hold all the Bees. I had only one alternative left,—and that was to take from my colony a collateral-box. I therefore took it; and a most beautiful box it was: its weight was fifty pounds. I immediately placed an empty box in the situation the full one had occupied. I then drew from the side of the pavilion the dividing tin-slide, and the whole of the colony was shortly at the desired temperature of 65, that being the exterior heat of the evening. I was now fully convinced of the propriety of returning the swarm. I commenced operations for accomplishing that object at ten o'clock in the evening, by constructing a temporary stage near the mouth of the parent-stock. I then procured a white sheet, and laid it upon the table or temporary stage, and in a moment struck the swarm from the hive into which the Bees had been taken from the bough in the evening. My next difficulty was to imprison the sovereign of the swarm; but with a little labour I succeeded in discovering her, and made her my captive. No sooner was she my prisoner than the Bees seemed to be acquainted with her absence. But so

near were they placed to the mouth of the parent-stock that they soon caught the odour of the hive, and in the space of about fifteen minutes the whole swarm, save only her majesty, were happy under the roof of their parent-home. The following morning increased my anxiety about the welfare of my stock. Fearful lest my curious anticipations should meet with a disappointment, at sun-rise in the morning I released from her imprisonment the captive Queen. I placed her on the front-board, near the entrance of her hive, to ascertain, if possible, whether there was within the state one greater than herself. But no visible sign of such being the case presented itself. The influence of the blessed sun soon caused her to move her majestic body to the door of her palace, where she was met, surrounded, and no doubt welcomed by thousands of her subjects, who soon conducted her to the seat of her native throne, which a few hours before she had been compelled to abdicate. The Bees afterwards sallied forth with extraordinary alacrity and regularity, and, beyond my most sanguine expectations, filled a large glass with honey in the short space of six days. That glass of

honey was exhibited at the National Repository, with a model of my apiary, and was much admired by many of the members of that noble institution.

I have now to remark, that during the nine days after the swarm had been returned to the parent-stock, the thermometer continued rising until it reached the temperature of 90 within the collateral-box; and on the tenth day, at five o'clock in the morning, I witnessed the grand secret,—I viewed with pleasure the extraordinary fact I had been endeavouring to ascertain—*two royal nymphs were laid prostrate on the lighting board*, near the exterior entrance of the hive. This circumstance alone convinced me that no more swarming was necessary. I have further to notice, that on the third day afterwards the Bees commenced their destruction of the drones,—which was a satisfactory proof that I had gained my point. That colony has never swarmed since the period I first discovered the use of ventilation. And on minutely attending to the extraordinary movements of this my favourite colony, it was not uncommon to notice the most infant appearance of the royal brood lying upon the front-board of

the pavilion. So that I am well satisfied that the royal larvæ is always in existence in the hive, independently of the reigning Queen. Let me not be misunderstood; I do not mean by this expression to assert—that the royal larvæ exists in the hive without the instrumentality or agency of the reigning Queen;—far from it; for no common Bees can make a sovereign Bee without the influence of the royal body: what I do mean is—that the the royal larvæ is always in existence in a colony of Bees, notwithstanding the existence and presence of a reigning Queen—that the Queen is there, and that the royal larvæ is there at the same time. In this the wisdom of Providence is demonstrated; for Nature has *thus* provided that the royal cradle should contain the royal brood, that in case any accident, misfortune, casualty, or necessity, should occasion the absence of the reigning Queen, another may be brought forth. This larvæ in reserve, as it were, is protected and reared by the inhabitants with the utmost care, nay, in the absence of the Queen, it is almost worshipped, until it becomes sufficiently matured to take the office and fulfil the duties of its royal predecessor; of course it then

reigns supreme,—it is then Queen absolute. I agree in the opinion of Dr. Thorley, and as my practical management of honey Bees is so different from that of ancient, as well as of modern practitioners, I must expect much criticism and controversy on the subject of male and female.

The following thermometrical observations are from the journal before mentioned. The first column gives the day of the month,—the second shows the hour of the day when the thermometer was examined,—and the third is its height at those several times in a colony of Bees, but not in that colony upon which my experiments were so successfully made.

1826.		
April	Hour	Ther.
1	8	35
—	12	46
2	8	38
—	12	43
3	8	32
—	12	37
4	12	37
5		37
6		37
7		37
8	8	40
—	12	45
9	8	46
10	12	58

At this state of the Thermometer it is highly necessary to remove your Bees to their summerstand. A great decrease of wealth in the hive will appear daily under this temperature; and feeding should be resorted to until the change of the interior rise to 50.

If the thermometer continue to rise, you will find your hive improve much. It will be in a

April	Hour	Ther.
11	6	46
—	10	58
12	9	52
—	1	64
13	12	64
14		64
15		64
16		64
17		64
18	8	54
19	12	60
20		56
21	12	58
22		50
23		52
24		60
25		65
26		70
27		74
28		68
29		74
30		70

good state for the spring. Considerable improvements in the combs, and immense gathering of farina, appear to occupy the Bees at this time.

The enemies of Bees are numerous and active in this month. The chapter on the enemies of Bees will caution the Bee-master against their attacks, and instruct him how to defend his Bees against them. At all times keep their floor-boards clean; and now withdraw the dead Bees, if there should appear to be any lying on the floor-boards or other stands. This will save the live Bees much labour, and may be done very easily.

May	Hour	Ther.
1	5	42
—	9	58
—	12	70
2	5	41
—	8	48
—	12	60
3	5	43
—	12	56

Swarming may be expected in this month, if the hives be rich and the season favourable. To prevent which enlarge your hives, by adding a round or two to the bottom.

If you have the collateral-

May	Hour	Ther.	
4	7	51	box hives, you need only draw
5	7	52	up the tin-slides, or one of
—	4	52	them, as occasion may require.
6	7	46	By this means you enlarge the
—	1	63	Bees' domicile without admit-
7	5	42	ting the atmospheric air. This
8	12	60	move so pleases these indefati-
9	1	78	gable creatures, that you will
10	12	58	behold at once the utility and
11	12	54	the humanity of this mode of
12	12	62	management.
13	12	72	
14	12	70	
—	1	75	Should the weather be sea-
15	5	43	sonable, the boxes will now be
—	12	70	filled rapidly, and the ther-
—	2	74	mometer will rise quickly. At
16	12	70	this period ventilation will
17	12	68	demonstrate what has hitherto
18	8	58	been a secret of nature;—viz.
19	8	50	many young sovereigns in va-
—	12	70	rious states of perfection will
20	8	58	be seen daily cast out of the
—	12	60	hives: and the waxen cells will
21	8	54	be extended to the remotest
—	12	62	corners of their domicile.
—	2	58	
22	8	54	Riches are now rapidly ac-
—	12	62	cumulated: and the glasses
—	2	70	filled with the purest sweets.
24	7	50	

May	Hour	Ther.	Small glasses may be taken
24	12	68	off from the inverted hives, if
—	2	72	the weather prove fine.
25	5	60	Mem.—A glass of honey
—	8	62	weighing 12 lbs. and a collate-
—	11	64	ral-box weighing 42 lbs. taken.
—	12	70	After taking the above trea-
—	3	71	sure from the collateral-hive,
26	7	58	and placing an empty glass
—	10	74	and an empty box in the places
—	1	80	of those taken off, the interior
—	4	73	temperature was reduced to 60
27	6	61	degrees, while the atmosphere
—	10	74	was 56 at twelve o'clock at
—	12	84	night.
—	2	82	The pure honey taken was
—	4	80	about one fourth of the weight
—	5	70	of the hive, and it will be ob-
28	6	60	served that the heat shows a
—	12	68	decrease in the temperature of
—	2	68	one fourth.
—	3	70	
—	8	61	
29	5	60	
—	10	64	
—	1	76	
—	7	66	
—	9	64	
30	6	60	
—	8	64	
—	9	74	
—	12	78	
31	6	61	
—	12	74	
—	2	78	
—	4	76	

June	Hour	Ther.
1	7	62
—	12	76
2	6	62
—	12	78
—	5	76
3	6	60
—	12	76
—	5	74
4	6	60
—	12	74
—	3	78
5	6	54
—	12	68
6	6	58
—	12	66
—	3	62
7	6	54
—	2	62
—	4	64
8	6	52
—	12	56
—	4	52
9	7	54
—	12	74
—	2	80
10	6	60
—	12	74
—	3	72
11	6	60
—	12	70
—	3	76
—	4	78
—	9	70
12	6	64
—	12	74

Mem.—A collateral-box of honey weighing 56 lbs. and a glass on the 10th weighing 14½ lbs. taken.

June	Hour	Ther.
12	2	82
13	6	60
—	10	82
—	12	90
14	6	64
—	12	84
—	2	88
—	4	86
15	7	66
—	10	70
—	3	88
—	6	80
17	12	70
—	3	88
—	9	68
18	6	66
—	12	70
—	2	76
19	6	60
—	12	70
—	5	66
20	8	60
—	12	70
—	3	76
21	7	60
—	12	70
—	3	72
22	9	70
—	12	70
—	3	65
23	6	70
—	12	75
—	3	82
—	6	76

Mem. — A collateral-box
weighing 60 lbs. and another
weighing 52 lbs. taken.

June	Hour	Ther.
24	7	66
—	8	82
—	3	90
25	6	70
—	10	90
—	12	94
26	7	86
—	11	94
—	5	91
—	9	86
27	7	84
—	9	90
—	1	96
28	6	88
—	12	94
—	11	90
29	6	86
—	12	94
—	2	96
—	7	91
30	5	90
—	12	96
—	4	84

July	Hour	Ther.
1	6	94
..	12	96
..	4	94
..	7	94
2	6	94
..	12	96
..	6	94
..	10	94
3	6	94
..	12	96
..	6	94
..	10	90
4	6	92
..	12	94
..	6	90
5	6	90
..	12	92
..	6	90
7	6	90
..	12	92
..	6	92
..	10	92
8	7	92
..	12	92
..	6	90
..	11	90
9	6	88
..	12	92
..	3	82
..	10	80
10	6	78
..	12	80
..	6	82
11	6	80

If the pasturage for Bees begin to fail in your neighbourhood at this time, it is advisable, if it be practicable, to remove your colonies to a better and a more profitable situation. You will be richly rewarded for this attention to the prosperity of your apiary.

July	Hour	Ther.	July	Hour	Ther.
11	12	84	16	10	80
..	6	86	17	6	78
..	10	90	..	10	78
12	6	86	..	12	80
..	12	80	18	6	76
..	6	76	..	12	80
..	10	74	..	6	78
13	6	74	..	10	76
..	12	76	19	6	76
..	6	76	..	12	80
14	6	76	..	6	74
..	12	78	..	10	74
..	6	76	20	6	68
15	6	74	..	12	70
..	12	76	..	6	70
..	6	78	..	10	70
16	6	78	21	6	66
..	12	86	..	12	68
..	6	88	..	4	64

Summary of memorandums of the several deprivations or takings of honey from one set of boxes this season:

May 27. Glass and box .. 54 lbs.

June 9. Box 56 ..

— 10. Glass $14\frac{1}{2}$..

— 12. Box 60 ..

— 13. Ditto..... 52 ..

Collateral-box 60 ..

296 $\frac{1}{2}$ lbs.

Did I deem it necessary, I could, from the letters of a variety of highly respectable correspondents, show that the mode of managing Bees in the way, and upon the principles, now explained, has been adopted, and *has succeeded* even beyond the most sanguine expectations of many of my worthy friends and patrons; but I will content myself at present with giving the two following letters, which I have just received from a gentleman in this neighbourhood, whose very name, to all who have any knowledge of or acquaintance with him, will be a sufficient guarantee that his statements are facts. Besides, his letters are a condensed, and I must say—clever

epitome of my practical directions for the management of Bees in my boxes, and may be useful on that account; and moreover, I have, as will be seen presently, his unsolicited authority to make them public, and therefore run no risk of being called to order for so doing.

“Gedney-Hill, 13th July, 1832.

“Dear Sir,

“You will, I am persuaded, excuse me for troubling you with the information that I yesterday took off a fine glass of honey from one of my Bee-colonies. I went to work *secundum artem*, that is, in one word, *scientifically*, or in four words, *according to your directions*; and I have the satisfaction, nay more,—I have the pleasure to add that I succeeded—I had almost said *completely*, but I must qualify that expression by saying, that *I succeeded all but completely*; for one luckless Bee had the misfortune to be caught between the edges of the dividing-tin and the glass, and to be crushed to death in consequence. Excepting that accident, I believe that not one Bee was injured, nor lost. They left the glass, as soon as I gave them the opportunity

of leaving it, in the most peaceable manner; in a subdued and plaintive tone they hummed round me,—settled upon me,—crept over me in all directions,—but not one of them stung me; in short, they returned to their home without manifesting the slightest symptoms of resentment, and in less than half an hour from the commencement of the operation, *there was not a single Bee left in the glass.* In my eye it is a very handsome glass of honey; it weighs exactly 13lbs. and it has not one brood-cell in it. I intend to close it up,—to label it,—and to keep it, at least until I get another as handsome. It is a *rich* curiosity to exhibit to one's friends, especially to those who have never seen such a thing.

“On the other side I send you a fortnight's register of the heights and variations of a thermometer placed in the colony from which I have taken the glass, and also of one placed in the shade, and apart from all Bees; from which register you will know in a moment whether I have managed my Bees properly. I am willing to flatter myself that I have, and that you will say I have been very attentive indeed.

1832.		Ther.	Ther.	1832.		Ther.	Ther.
July	Hour	in the Colony	in the Shade	July	Hour	in the Colony	in the Shade
1	11	86	66	5	9	88	64
..	6	88	66	6	8	88	64
2	6	90	65	..	2	88	65
..	10	92	66	..	9	88	64
..	1	92	66	7	8	89	64
..	9	86	65	..	9	88	64
3	8	88	65	8	9	86	64
..	1	87	65	..	9	86	64
..	3	89	65	9	7	90	64
..	5	87	64	..	2	89	65
..	9	88	64	..	8	88	66
4	4	88	64	10	8	88	66
..	10	83	64	..	2	89	66
..	12	86	65	11	9	88	66
..	5	90	65	..	2	89	66
..	9	86	64	12	9	90	65
5	7	89	64	..	1	94	66
..	10	88	64	..	9	89	68
..	1	90	65	13	8	89	66
..	5	89	65	..	5	90	66

"In addition to this I could, time and space permitting, tell you from what point the wind blew on each of these days, when it came full in front of my boxes, and when it came upon them in any other direction, when it was high, and when it was otherwise, on what days the Bees were able to get abroad, and also when they were kept at home by rain, or by any

other cause. From these observations of the wind and weather, and particularly from the manner in which the wind is directed towards, or into the ventilators in the boxes, in conjunction with the movements of the Bees, I think I can account pretty satisfactorily for what may appear, at first sight, to be a little contradictory, viz. for the rising of the thermometer in the boxes sometimes when it was falling in the shade; and vice versâ, for its sometimes rising in the shade when it was falling in the boxes. But instead of writing you a dissertation on these subjects, or on any of them, I choose rather to put you into possession of the whole of my Bee-practice, by submitting to your notice a copy, or as nearly as I can make it a copy, of a letter I took the liberty of addressing to the Editor of 'The Voice of Humanity' in October last, after the appearance in No. V of that publication of a representation and *imperfect* explanation of your boxes. I was encouraged to write that letter by the following announcement in an article in that No.—'A due regard of rational humanity towards the Bee, though but an insect, we shall feel a pleasure in promoting in the future as well as the present

pages of our publication. This subject has, moreover, a very strong claim, inasmuch as it also exemplifies the grand principle upon which The Voice of Humanity is founded—the true *prevention of cruelty* to animals, by substituting a practical, an *improved system*, in the place of one which is defective; this, in reference to the present subject, &c. *is true prevention of cruelty*, not only to units, but to thousands and tens of thousands of animals.’ Notwithstanding this very *rational* announcement, and the prompt acknowledgment of the receipt of my letter, it did not appear in either of the next two numbers, nor am I aware that it is in the last, but I have not yet seen the last No. of that publication, therefore must not be positive. But this is not all: in No. 6, the conductors of that work express ‘sincere pleasure’ in inserting an article which, they say, ‘forms an admirable addition to that on Mr. Nutt’s Bee-hive;’ and that ‘the plan which it develops, in addition to its humanity, has the recommendation of being more simple and practicable than even the excellent improvements of Mr. Nutt.’ Now what do you suppose this *admirable* addition to your Bee-hive,—this plan recommended on

account of its *humanity*, as well as on other accounts—is? It is no other than that most cruel and destructive one of depriving Bees of their honey *and of every thing else*, by driving them out of a full hive into an empty one, so early in the season as to afford the Bees sufficient time to provide themselves with another stock of winter food before the bad weather begins.’ Very considerate this, certainly! but who can tell how soon the bad weather may begin? Of all the methods ever resorted to of getting their honey from Bees, this, in my humble opinion, is the most cruel and *inhuman*: suffocating the Bees and destroying them at once is far preferable to this (I had hoped) exploded mode of robbing them. If practised, it will, however, soon cure itself: but is it not a strange practice for ‘The Voice of Humanity’ to revive? Either the utterers of that sweet Voice are unacquainted with the humane management of Bees upon your plan, or they are unaware of the mischievous and destructive consequences attendant on the driving mode of deprivation, or they have little claim to the title they bear on the score of their humanity to Bees. I believe the former to be the case with them:

and therefore, in addition to the reason already given for troubling you herewith, and in order to set them right on this *vital* subject, I give you full power to do what you please with these letters. If they will be of any use to you in your projected publication, give them a place in it, and welcome: only do not garble them, *give them entire, if you give them at all.* I am decidedly opposed to the driving scheme; and I as decidedly approve of yours, which is, if properly attended to, at once simple, practicable, profitable, admirable, and *truly humane.*

Accept me, Dear Sir,

Yours very truly,

THOMAS CLARK."

"Mr. Editor,

"Since the publication of the last No. of 'The Voice of Humanity,' in which you treated your readers with some interesting particulars explanatory of the construction and different parts of Mr. Nutt's Bee-boxes, and also of the mode of managing the Bees in them, so far at least as regards the taking away a box when stored with the delicious sweet (i. e. with honey); it has been

suggested to me, that a plain, simple history of a colony of Bees in my possession, and managed according to Mr. Nutt's excellent plan, may not be altogether unacceptable to the general readers and friends of 'The Voice of Humanity,' and may be even a treat to amateur apiarians, who may be unacquainted with the merits of Mr. Nutt's plan; or who, if partially acquainted with it, may have their doubts as to its practicability, or, at least, as to its advantages, i. e. superiority over other plans. As far, then, as 'The Voice of Humanity' can make them (the merits of Mr. Nutt's plan) known, I trust it will be as music to that Voice to publish the following facts.

"Having had a complete set of Mr. Nutt's boxes presented to me, I, though comparatively a novice in apiarian science, and not at that time particularly attached to it, could not, in compliment to the donor, do less than endeavour to work them, that was—get them stocked. That was done with a swarm on the 18th of May 1830; and the middle-box, or pavilion of nature, as Mr. Nutt calls it, into which the said swarm was taken just in the same way as it would have been if put into

a common straw-hive, was conveyed a distance of nearly four miles, and placed in my garden in the evening of the same day. The next day being fine, I observed that the Bees were very busy constructing comb, and had, within twenty-four hours of their being domiciled in their new abode, actually made a progress in that most curious work that astonished me: they were passing and re-passing, and literally all alive; many were visibly loaded with materials for their ingenious work. My curiosity was excited, and so much was I pleased with my multitudinous labourers that I visited them daily, and many times in the course of each day, when the weather was favourable for their getting abroad. Their combs were rapidly advanced; but to my great mortification they very soon obstructed my view of their interior works, by bringing a fine comb quite over the only little window at the back of the pavilion, at the distance of about half an inch from the glass. I was not, however, without the means of ascertaining that they were filling the pavilion with their treasures, and consequently that they would soon be in want of more room. I, therefore, at the end of a fortnight, admitted them into the large bell-glass by withdrawing

the slide, which, when closed, cuts off the communication between the pavilion and the said glass. They (the Bees) immediately reconnoitred it, as it were, and examined it round and round, and presently took possession of it in great numbers; and in the course of the second day afterwards I could perceive that they began to continue their work upwards from and upon the combs in the box. Here I was again inexpressibly gratified by daily observing the progress of their beautiful work, and by the busy thousands in perpetual motion. When they had about half-filled the glass, and before I was aware that there was any occasion for their admission into either of the collateral-boxes, they suddenly threw off a swarm. That event I attribute partly to my own inexperience in apiarian matters, and partly—principally to the want of a thermometer by which to ascertain and regulate the temperature of the crowded pavilion, so as to keep the Bees *at the working, and below the swarming point of heat.* Mr. Nutt assures me that a barn would not contain a colony of Bees if its temperature were raised above a certain degree. What that precise degree of heat is I leave to Mr. Nutt to determine and explain:

at present it is enough to state that I am convinced it is possible, nay, quite easy, to keep Bees at work, and to prevent their swarming, by giving them plenty of room, and by proper ventilation. After my Bees had thrown off the swarm, as abovementioned, the work in the glass progressed but slowly, indeed it was for some time almost deserted, owing, I presume, to the room made in the pavilion by the absence of the thousands that had left it: for, whenever the weather was such that they could get abroad, they were always busy. The season, however, it is well-known, was so wet as to be very unfavourable for Bees:—the summer of 1830 was not by any means what is called a Bee-year; and early in the autumn I could see that, instead of adding to their store, they were under the necessity of living upon it. They were, however, abundantly provided for the winter, and lived through it almost to a Bee. In the spring of this year (1831) they appeared to be strong and in excellent condition. As early as the middle of May they had replenished the emptied combs in the glass, and, it may be presumed, in the pavilion too. In the first week of June the glass was completely filled

in the most beautiful manner. I therefore opened the communication to one of the end or collateral boxes, and two or three days afterwards, viz. on the 10th of June, I took off the glass, and replaced it with another. So rapidly did those industrious little insects proceed with their work, that in about six weeks they completely filled the end-box. I then opened the way to the empty box at the other end of the pavilion: and a few days afterwards had the full box taken off by Mr. Nutt himself, (who happened to call upon me, and who handsomely volunteered his services on the occasion,) without any stifling of any sort—without the destruction, or the loss, of—scarcely a Bee,—as nearly in the manner described in your last No. as circumstances would permit; for the Queen Bee being in the box taken off, made it necessary for Mr. Nutt to vary the operation a little;—not a person was stung, though ladies, very timid ladies, and children too, were among the admiring lookers on; only, in returning the the Queen Bee, found in the box, to the pavilion, I myself was stung, owing to my over-anxiety to see how she would be received by the Bees in the pavilion. Her majesty's

presence in that box (the box taken off) at that time might probably have puzzled me; but to Mr. Nutt it presented no difficulty; and to witness his operation was to me a most instructive lesson, and would have delighted any friend of humanity. It was performed in the middle of a fine day. That box contained, as nearly as we could estimate, about 35 lbs. of honey, incomparably purer and finer than any I ever saw, except from Mr. Nutt's boxes. The glass before mentioned contained 12 lbs.—so that I have this year taken *forty-seven pounds* of the very finest honey from one stock of Bees;—I have all my Bees alive—and they are at this time abundantly provided for the ensuing winter; nay, without impoverishing them, I believe, I might take 6 or 8 lbs. more; but I have already had enough; and, if my Bees have more than enough for their winter's consumption, they will not waste it;—it will be found next year.

“The preservation of the Bees unhurt, uninjured, very many of them undisturbed at all,—the quantity of honey that may be had,—and the very superior quality of that honey, are advantages of Mr. Nutt's mode of Bee-management, over the barbarous, stifling system,

that cannot fail to recommend it to the adoption of every friend of humanity,—to every lover of the delicious sweet,—and to every apiarian who has nothing beyond self-interest in view.

“One word more, and I have done. There are, I observe with pleasure, persons of considerable influence among your subscribers, and probably there may be persons of still greater influence among your readers. To such I would most respectfully suggest the propriety of doing something to reward Mr. Nutt for the services he has already rendered the honey Bee and the cause of humanity. I—an obscure, country clergyman, know not how to set about procuring it; but a *premium was never more richly deserved.*

“Though longer than I intended, when I sat down to write, I hope you will find no difficulty in giving the foregoing communication a place in your pages; and, in this hope, I beg to subscribe myself,

Your humble Servant,

THOMAS CLARK.

“Gedney-Hill, near Wisbech;

October 20th, 1831.”

CHAPTER VI.

ON DRIVING BEES.

As my reverend correspondent has introduced the subject of *driving* Bees from their full hive into an empty one, in order that they may be deprived of their honey and wax, and has animadverted upon that practice with some severity, I will take the opportunity of here stating my objections to it.

Mr. Huish, in his treatise on Bees, has twice described the manner in which "*driving a hive*" may be performed; but nowhere, that I can find, has he once recommended it. In a note (in page 24) he says—that "*by driving a hive* may be understood, the act of obliging the Bees to leave their own domicile, and take refuge in another. This is performed by placing the full hive under an empty one, (or, he might have said, by placing an empty hive

upon the full one inverted) and by gently tapping the lower hive, the Bees will ascend into the upper, and the lower one then remains vacant, for experiments, or the purpose of deprivation." He afterwards (in page 252) gives a more detailed account of the manner of performing this operation; and having done so, he presently observes that "by the driving of the Bees a number is unavoidably killed." I do not find that Mr. Huish himself practises it further than for the purpose of making experiments; and that, having made those experiments, he returns the driven Bees to their hives and to their treasures in them. In short, he describes it to his readers because they may wish to be acquainted with it, and not because he approves of it. I mention this because I consider Mr. Huish to be respectable authority on such a subject.

Now, were there nothing in a hive but Bees and honey, driving them into an empty hive (were it as easy in practice as it seems to be upon paper, though I presume it is not) in order to rob them of their all, would be a most arbitrary and unjust method of treating them: but, besides Bees and honey, there are other substances in a prosperous hive which ought not

to be disturbed. There are the future inhabitants of the colony in every stage of existence from the egg to the perfect Bee, and these in a driven hive are all totally destroyed—eggs, larvæ, nymphs, in one word, *the brood*, in whatever state, is all destroyed, when the Bees are driven from it and not suffered to return. And is it not an unnatural operation that thus destroys many thousands of lives in embryo, over and above the “*number unavoidably killed*” thereby? as painful must it be for the Queen—the mother of the colony, and to all the other Bees, to be *forcibly expelled* from a hive and home of plenty and prosperity, as it is for an industrious man and his thriving family to be rudely ejected from a comfortable house and home, without the least notice of, or preparation for, so calamitous an event, and forced by lawless marauders to take shelter in an empty house, and left there destitute, to subsist as best they can, or to starve, as probably they may, their spirits being cast down by the violent deprivations and desperate robbery they have experienced, and it may be, the winds, and the weather, and the elements of heaven, warring, as it were, against them at the same time. And, comparatively speaking,

is it not so with *driven* Bees? They are turned topsy-turvy, and in that strange, unnatural position, their fears are operated upon, or excited, by unusual, and to them, no doubt, terrible sounds made by even "gently tapping" their inverted hive—their house turned upside down. Though no advocate for suffocating Bees, but on the contrary—a decided opponent to it, I agree in opinion with my correspondent that suffocation at once is preferable to the very reprehensible practice of "driving a hive," inasmuch as an instantaneous death is preferable to a lingering and unnatural one by starvation, which, whatever may befall the driven Bees, is the hard, untimely fate of the brood and young larvæ of a hive when the Queen and commoners are driven from them into a new and empty domicile. They leave, because they are forced to leave behind them, and to perish, thousands of the young brood in a state of helplessness. Their mother and their nurses are driven into banishment and pauperism, while her offspring are doomed to perish for the want of their aid and support. If driving be practised early in the season, that is, in June or July, all the brood then in the driven hive must inevitably perish; if later,

it is hardly to be expected that the surviving Bees will or can prosper. Can the Bee-master for a moment think that when Bees are so driven from their old hive, they will work in their new one, as if they had swarmed voluntarily and then been put into it: it is some considerable time before Bees thus treated will work vigorously; and during that time of lingering and irresolution the honey-season fast declines,—the Bees' difficulties multiply, —and they become paupers at a time they should be rich. Nine times out of ten the hive so treated perishes by famine, and like the young brood, dies the worst of deaths,—the whole hive becomes a melancholy wreck, and is absolutely sacrificed to the mistaken notions of the speculating or experiment-making proprietor. It is a practice of which I disapprove altogether: and I am surprised that any one could so far misunderstand the principles and nature of my practice as to recommend the driving of Bees out of a full hive into an empty one as an admirable addition to my Bee-hive—that is—to my Bee-boxes. I have the satisfaction, however, to state that in the management of Bees in my boxes *no driving is necessary, nor even*

possible: by them *driving* and *suffocation* are both superseded, and rendered as useless to operators as they have long been destructive to Bees,—and, I cannot but say—disgraceful to apiarians. What I have already said (in page 47) I will here repeat with as much emphasis as I am able, because that passage comprehends the very essence of my directions relative to the management of Bees in the middle-box,—and because those directions are utterly incompatible with *driving*. “I say, then, DISTURB NOT THIS HIVE—THIS PAVILION OF NATURE: WEAKEN NOT ITS POPULATION; BUT SUPPORT ITS INFLUENCE, AND EXTEND TO IT THOSE ACCOMMODATIONS, WHICH NO PRACTICE, EXCEPT MY OWN, HAS YET PUT INTO OPERATION, OR MADE ANY ADEQUATE PROVISION FOR.

“This humane practice partakes not of the *driving*, nor of the *fumigating*, nor of the *robbing* system. It is a *liberal principle* of Bee-cultivation, founded on *humanity*. And it is by such practice that we must be benefited, if we hope to succeed in the culture of honey Bees.”

CHAPTER VII.

INVERTED HIVE.

MANY useful discoveries have been made by accident;—and to some of the greatest and grandest of those discoveries even philosophers and men of science have been led by accidents apparently the most trifling and insignificant.

To the playful tricks of some little children that astonishing and most scientific instrument—the telescope, it is said, owes its origin; and it is said also that that great and good man—Sir Isaac Newton was led to investigate the laws of gravitation by accidentally observing an apple topple to the ground from the twig that had borne it. One of the sweetest of our poets, however, informs us—that

All nature is but art, unknown to thee,

All chance, direction, which thou canst not see.

If, therefore, a beautifully delicate honey-comb suspended from the stool of a hive first

led me to discover the utility of ventilation in a colony of Bees, though there may be nothing very surprising, there is, I trust,—nay, I am convinced, and therefore I assert—there is something very useful in it: and if an accident of another description induced me to endeavour to turn it to advantage, there is nothing to be greatly wondered at. So, however, it happened; and here follows the account of it.

On rising early one morning in July 1827, and walking into my apiary, as my custom then was, and still is, I discovered that some malicious wretch had been there before me, and had overturned a fine colony of Bees. The reader may judge how much my indignation was aroused by that dastardly act of outrage against my unoffending Bees. My feelings of vexation soon, however, subsided into those of pity for my poor Bees; and fortunately for them, no less than for me, their overturned domicile, which consisted of a hive eked or enlarged by a square box upon which I had placed it some weeks previously, was so shaded from or towards the east by a thick fence, that the rays of the sun had not reached it;—this compound-hive and the

countless thousands that were clustering around it, were prostrate in the shade. I viewed my distressed Bees for a considerable time, and studied and planned what I might best do to relieve them, and, if possibly I could, rescue them from the deplorable situation into which they had been thrown. At length I determined to reverse the whole, which I effected by first carefully drawing the box as closely as I was able to the edge of the hive, and then placing the hive upon its crown, so that, in fact, the whole domicile was inverted. I shaded, protected, shored-up, and supported the Bees, their exposed works, and their hive, in the best way I could, and afterwards reluctantly left them for the day, being under the necessity of going from home to Wisbech, a distance of almost twenty miles. On my return in the evening, I could discern evident proofs of the willingness of the Bees to repair the sore injury they had sustained; and on the third day afterwards, I was highly pleased to witness the progress their united efforts had made to rescue their dilapidated habitation from the ruin that had threatened it and them too, and which, I confess, I had anticipated. I was particularly

attentive to their movements. I assisted them by every means I could devise. They gradually surmounted all the difficulties to which they had been exposed. In short, they prospered; and from that malicious trick of some miscreant or other I first caught the idea of an *inverted-hive*, which I have since studied and greatly improved.

No Bee-master will have neglected to observe—that this curious, I may say—intelligent, little insect—the Bee, is ever alive to the most ready methods of extricating itself from difficulties, and of bettering the condition of the state, whenever accident or misfortune has placed it in jeopardy: and, I will add—that the timely assistance of the Bee-master will frequently save a stock from that ruin which apparently trivial circumstances, such for instance as uncleanness, excessive heat in summer, or intense severity of winter, may, and very often do, occasion.

The subjoined cut is a representation of an **INVERTED HIVE** fixed in its frame, trellised, roofed, completely fitted up, and just as it appears when placed in an apiary and stocked with Bees.



A. is a stout octagon-box, in which is placed an *inverted-hive* containing the Bees. Its diameter within the wood, I mean its *clear diameter*, is seventeen inches, and its depth, or rather its height, is fifteen or sixteen inches, or just sufficient to reach to, and be level with, the edge of the inverted-hive, when placed within it: in fact, the octagon-box (A.) is a

strong case or cover for the inverted-hive; and, if made an inch or two deeper than the hive to be placed in it, it is an easy matter to pack the bottom so that the edge of the hive and the top-edge of the octagon may be exactly on a level. Fitted and fastened to this is a top or floor, made of three-fourths-inch deal, which should sit closely upon the edge of the hive all round. The centre of this top is cut out circularly to within an inch and a half of the inner circumference or edge of the hive over which it is placed. Upon this floor is a box seventeen inches square within, and four inches deep. This I call the ventilation-box, because through two of its opposite sides are introduced horizontally two cylinder ventilating-tubes, made of tin, thickly perforated, and in all respects similar to those described in page 26. The top of this box is the floor upon which nine glasses are placed for the reception of honey, namely—a large bell-glass in the centre, and eight smaller ones around it. By a *large* bell-glass I mean—one capable of containing twelve or fourteen pounds of honey, and by *smaller* ones—such as will hold about four pounds. The Bees of an inverted-hive in a good situation will work well in

glasses of these sizes, and soon fill some or all of them: but, if in an unfavourable situation, lesser glasses, down to one-half the above mentioned sizes, will be more suitable. Situation, season, and strength of the stock,—strength, I mean, as respects the number of Bees, must, after all, guide the apiarian in this matter. The floor above mentioned should be made of three-fourths-inch deal. Of course proper apertures must be cut through this floor under each of the glasses to admit the Bees into them from the box beneath. Around and over the glasses is placed another neat box or case, made like the ventilation-box, upon which it rests or stands. The lid of this box is made to open and shut. It is represented in the foregoing cut as opened at B. an inch or two, and may be so retained at pleasure by a proper weight attached to a cord passed over a pulley fixed in the inside of the roof (C.) and fastened to the edge of the lid above B. The depth of the box or cover for the glasses must of course be regulated according to their different sizes. The alighting-board is on the front-side, directly opposite to the latticed doors, and on a level with the upper-side of the first floor, so that the entrance for the Bees must be cut through

the lower edge of the ventilation-box; and is made there most conveniently for them to pass either into the inverted pavilion below, or into the glasses above such entrance, as their inclinations may direct.

The octagon-cover placed upon the pavilion-hive, as represented in the view of the closed boxes (in page 31) if *inverted*, would be a tolerably good model of part A. of the inverted-hive.

I advise that every part be well made—the floors and the boxes particularly so; and that the whole exterior be well painted too, previously to being exposed to the sun and to the weather. This advice has reference to all my boxes and hives, collateral as well as inverted.

The stocking of this hive may be easily effected in the following manner. Having made choice of a good, healthy, well-stocked, cottage-hive, you may, at any time between the beginning of March and the end of October, *carefully invert and place it in the octagon below the ventilation-box*, that is, in the apartment (A.) then fasten the floor with four short screws to the top of the octagon, taking especial care that this floor sits upon the edge of the inverted-hive all round. It will be necessary to keep the Bees from annoying you

whilst adjusting this floor and the other parts of the hive, by putting a sheet of tin over the open circular space in the floor; by which tin every Bee may be kept in the hive below. When the boxes, ventilators, glasses, and all things are duly adjusted, the dividing-tin may be withdrawn; and the operation of stocking will be then completed.

The Bees will commence their labour by filling the square box between the pavilion and the glasses, they will then extend their beautiful combs into the glasses above. The appearance of their most curious works in this stage of their labour is highly interesting—nay, gratifying, to the apiarian observer; and, moreover, proves the extraordinary influence and utility of ventilation in the domicile, or, rather let me say, in the store-house apartment of Bees; for in the pavilion, or breeding and nursing apartment, it is seldom wanted.

The method of taking off the glasses, whether large ones or small ones, when stored with honey, is in every respect the same as that of which a particular account has been already given, (in pages 38 and 39): to that account, therefore, I beg to refer the reader, instead of here repeating it.

CHAPTER VIII.

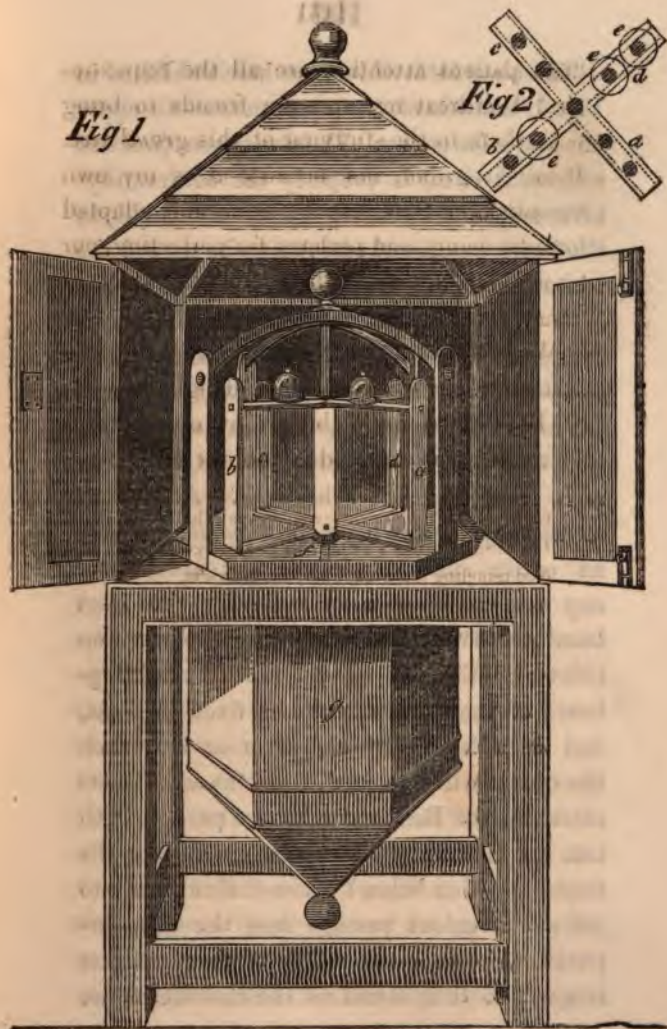
OBSERVATORY HIVE.

HAVING now given such a description and explanation of my *collateral box-hives*, and of my *inverted-hive*, as will, by referring to the plates or cuts that accompany them, make both of those hives, and every thing pertaining to them, to be clearly understood; I proceed to explain, in the next place, my OBSERVATORY HIVE. With the help of the subjoined representative figures or cuts, I hope to succeed in my endeavour to make the reader thoroughly acquainted with every part of it, novel though it be, and, as far as I know, unlike any hive hitherto invented. At first sight it may probably appear to be a piece of complicate machinery, but upon examination it will be found to be otherwise—I may say—simple and easy. A little curiosity and a

little patient attention are all the requisites that I entreat my apiarian friends to bring with them to the studying of this *grand hive*. I call it *grand*, not because it is my own invention, but because it is admirably adapted for advancing, and perhaps for perfecting, our knowledge of the habits and economy of honey Bees.

With the variation of one short word, the following passage from Evans' delightful poem on Bees is so applicable to my observatory-hive, that I am tempted to adopt it as a motto.

By this bless'd hive our ravish'd eyes behold
 The singing masons build their roofs of gold;
 And mingling multitudes perplex the view,
 Yet all in order apt their tasks pursue;
 Still happier they, whose favour'd ken hath seen
 Pace slow and silent round, the state's fair Queen.



The observatory-hive, as here exhibited in Fig. 1, consists of two apartments—an upper one and a lower one. The upper one, (marked a. b. c. d. e. e.) is properly the observatory-hive, and may be called the summer-pavilion; the lower one, (marked g.) may be termed the winter-pavilion. Of this winter-pavilion but little need be said, except that it is an octagonal box, in size, in substance, and in every respect, similar to the octagon-part of the *inverted-hive* described in the last chapter; save only that its top must not be cut away, as is there directed to be done. At present let us suppose this top to be a perfect plane—an entire surface, without any aperture of any sort to form a passage for the Bees from and through it down into the pavilion below; farther let us suppose an alighting-board of the usual size to be fixed in front, and on a level with this floor or top; then the quære will be—how, from the same front-entrance, the Bees are to have a passage both into the observatory-hive above, and into the winter-pavilion below? The difficulty is—to get a convenient passage into the summer-pavilion, because the whole of that pavilion is made to turn round on the shoulder of an

upright shaft, through which shaft the passage for the Bees must of necessity be made, and which does not admit of a bore of above an inch in diameter. As, however, this narrow, perpendicular passage is of no great length, (it need not be more than three inches) many thousands of Bees will, in the course of a few minutes, if necessary, make their egress and regress through it without incommoding one another. That this rather intricate part—the construction of this passage-work—may be fully comprehended, I will endeavour to illustrate it by references to a well-known article now standing on the table on which I am writing. It is a telescopic candlestick, the pedestal of which covers a square space upon my table, each side of which superficial square is three inches. Now suppose this candlestick was screwed or glued to the centre of the plain, tabular top of the octagon (g.) having one of its sides parallel to that side of the floor to which the alighting-board is attached. Next, suppose *that* side of the candlestick to be cut away so as to form an entrance into the interior of the pedestal, two inches in front and half an inch in height; and let there be a covered-way of this height,

from the opened side of the pedestal to the front-entrance of the hive; then, if the front-entrance be six inches wide, the Bees on coming in will enter this covered-way, which from six inches narrows to three at the part where they enter the pedestal, and begin to ascend the perpendicular passage which leads through it and through the upright shaft of the candlestick into the—at present—*supposed* apartment above. The top-part of a telescopic candlestick may be turned round at pleasure; consequently, if the pedestal be fixed and made immoveable, the top, and whatever may be upon that top and fastened to it, may be moved round notwithstanding: this is what we particularly want in the construction of an observatory-hive, and must, therefore, be particularly attended to. A piece of clean, close-grained wood—beech, elder, mahogany, or any other firm wood—made much in the shape of our telescopic candlestick, but of not more than two inches and a half in height, with a bore through it of an inch in diameter, and turned, that is, wrought in a lathe, so that an inch of the top-part may enter into, and neatly fit, the cap fixed round the inch bore at the centre of the bottom-frame of the upper

pavilion (Fig. 2), and which cap is represented by the moveable top of the candlestick, is, as well as I can describe it, the pedestal to support the observatory-hive,—is, with the cap just mentioned, the compound, or double-hinge upon which that hive is turned round,—and is also the Bee-way into that hive.

The way into the winter-pavilion, or octagon (g.) is made by cutting a circular hole through the very centre of the plane top, an inch in diameter, directly under the upward passage; so that the Bees, whether their way be into the summer-pavilion above, or into the winter-pavilion below, lies through the pedestal, and the only difference is, that one passage leads upwards and the other downwards. The covered-way, which has been so often mentioned, may easily be made by taking out of the under-side of the bottom-board of the panelled and roofed box, made to secure the observatory-hive, and which is placed upon the top of the winter-pavilion, just as much as will allow a sufficient space for that way.

Having completed the passages, my next business is—to describe the novel apartment into which the passage through the pedestal leads—that is, the real observatory-hive.

Figure 2 shows the upper glass-frame of this hive with two small circular openings through the top of each arm, over which openings are placed small glasses, (at e. e.) in both Figures, for receptacles for honey, and are intended to answer the same purpose as those do which are placed upon the inverted-hive. A line drawn from one extremity of any one of these arms or wings, to the extremity of the arm or wing directly opposite to it, is twenty-three inches; and the distance between the dotted lines, which are intended to mark the glass-way, or, in joiners' phrase, the *rebate* to receive the edges of the glass, is exactly one inch and three-fourths. The lower glass-frame, which in Fig. 1, is placed upon f. the shaft of the pedestal already described, is the exact counterpart of the upper frame, with the exception of its not having any perforations for honey-glasses: the only perforation in this frame is that at its centre; which must be made to correspond with that of the shaft, and be a continuation of the Bee-passage into the hive. These two frames are connected and made one by four upright pieces, or ends, (marked a. b. c. d. in Fig. 1,) these upright, end-pieces must be rebated, or channelled, to receive the

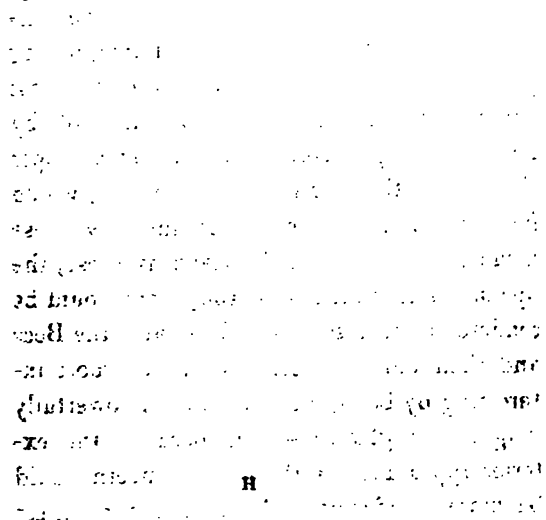
ends of the glass-plates. Eight squares of glass, each ten inches and a half by ten inches, fastened with putty into this frame-work,—that is, two squares into each wing, will complete the glass-hive, which, when placed upon the top of the pedestal, and made steady by an axis fixed at the central point of the upper frame, and turning in a socket under the ball, constitutes an *observatory-hive*. Confined as is the space between the glass-plates in each wing, they being but an inch and three-fourths apart, there is, nevertheless, room enough for the construction of one comb; and space for more than one comb would spoil it as an observatory-hive: and, though each wing may appear to be but small, there are upwards of 760 cubic inches of clear space in the hive. It is so constructed that plenty of light and the utmost transparency are afforded for observing and minutely examining the Bees and the works of the Bees in all their stages. Indeed the grand object of this contrivance is—to expose to public view the labours of the Bees in the inside of their hive; and, as the machine may be moved round at pleasure, not a Bee can enter it, without being observed, nor can a single cell be constructed in secret. I will

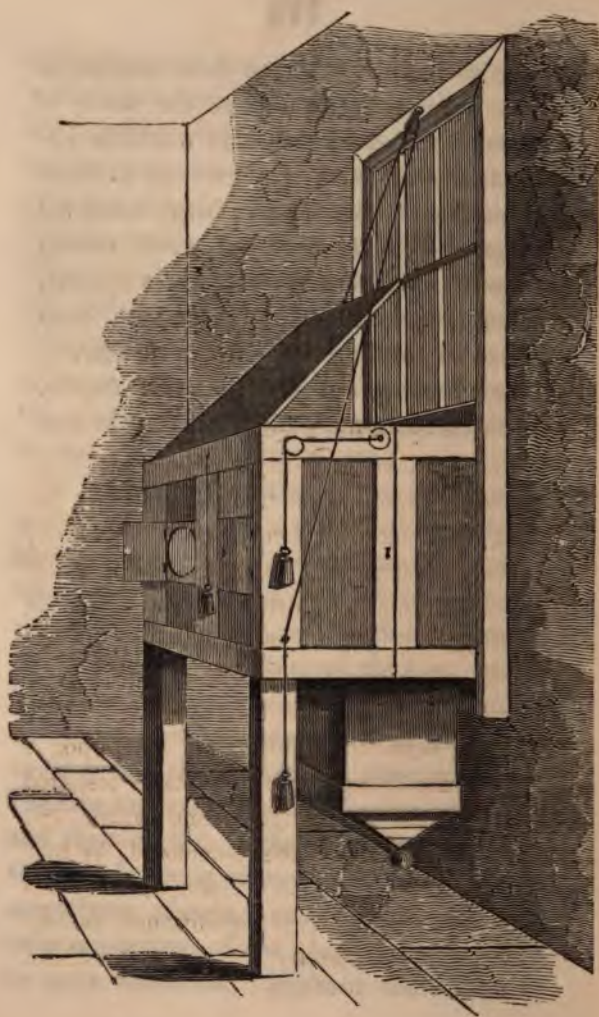
only add—that the appearance of the Bees in this hive is beautiful, and excites admiration and surprise,—nay, is capable of enlivening the drooping spirits of the most desponding apiarian; for who can view the Queen of the hive constantly laying her eggs, and, by so doing, constantly propagating her species, and her thousands of loyal subjects, whose indefatigable labour in all its parts is so conspicuous, without experiencing sensations of the purest pleasure—nay, more, of gratitude to God for his goodness to man?

It has been suggested to me by some ingenious friends—that a couple of magnifying glasses set in the doors, and some mechanical contrivance to open a part of the roof by simply pulling a cord, and to throw a proper light upon the four wings of the hive, would be a great improvement; because, by these means, or by some such means as these, the opening and shutting of the doors would be rendered unnecessary,—and, because the Bees and their curious works would be more interesting by being viewed through powerfully magnifying glasses,—and, because the exterior appearance of the whole concern would be more handsome. Without the slightest

hesitation I admit—that, to those persons to whom expense is no object, the mode of examining the observatory-hive would be improved by some such arrangements as those just mentioned; but *the hive itself would not be improved in the least*,—it would remain just as it was before these costly additions, whether ornamental, or useful; or both, were made to its covering only—*not to the hive*.

The following cut will, in some degree, explain an observatory-hive fitted up in this way.





THE MODE OF STOCKING AN OBSERVATORY
HIVE.

This operation may be performed in various ways, and almost at any time during the summer months, by an experienced apiarian. I will content myself with describing *how* it may be done most easily, if not most scientifically, by any person possessed of courage enough to operate at all among Bees. It is as follows:

When your Bees swarm from a cottage-hive, take it (the swarm) into a common hive in the usual way, place it in a cool, shaded situation, and let it remain there until the evening; and even then attempt no further operation, unless the Bees be all settled and quite still. When they are all within their hive, peaceable, and retired, as it were, for the night, you may suddenly strike them from their hive upon a clean, white sheet, spread over a table prepared and ready for the purpose, and within the space occupied, or rather—enclosed, by four bricks placed edgewise. Upon these bricks place your glass-hive as expeditiously as possible with its entrance just over the Bees.

Then envelope your hive in cloth so as to darken its interior, and, lastly, throw the corners of the sheet over the whole. This done, the Bees will presently ascend into the wings of the hive. When they are all safely lodged in it, you may carefully remove the sheet and the other coverings, and, having securely made up the entrance into the winter-pavilion, then place the stocked hive upon its pedestal, and the Bees will be ready to commence their labour the next day.

At the latter end of August you may invert the parent hive from which the swarm issued, and place it in the octagon-box (g.) below the summer-pavilion. Take out the plug that is between the two hives, that is—open the passage into the winter-hive, and you will have accomplished the union of the two families; they will join or unite, and thenceforward continue to labour as one family. By this movement you give to your Bees a winter residence secure from all enemies, which are numerous at this season. And so well-stocked will the winter-hive be, that an early swarm from it, for the observatory-hive, the following season, may reasonably be expected.

The honey may be taken from the e. e. glasses placed upon the arms of the summer-pavilion so easily, by turning round the loose boards under the glasses, that further explanation is unnecessary. The machine itself will point out to the perfect stranger the proper method of doing it.

CHAPTER IX.

FUMIGATION.

FUMIGATION is a rather portentous word; but, as soon as I shall have explained for what purposes, and in what manner, I occasionally make use of it, it will be totally divested of all *deadly* signification. In my practice it is not a Bee-destroyer, but a Bee-preserver;—when resorted to in my practice it is never carried, nor intended to be carried, to suffocation: but, in the operation of uniting weak swarms or poor stocks with more wealthy and prosperous ones—which I consider to be a meritorious and most humane practice,—when it is necessary to examine the state and condition of even a populous colony, should unfavourable symptoms as to its healthiness or its prosperity manifest themselves,—when it is known, or but suspected, that there are wax-moths, mice, spiders, or other Bee-enemies, lodged in a hive, which the Bees of

themselves cannot dislodge nor get rid of; and which, if not got rid of by man's assistance, would soon destroy almost any colony,—when Bees and their works (for I never transfer the former without transferring an ample sufficiency of the latter at the same time) are to be taken out of a decayed straw-hive, and to be put into a more substantial one, or into collateral-boxes, which I hold to be the best of all hives,—and on innumerable other occasions, it is absolutely necessary to *subdue Bees* so far as to render them incapable of using that formidable, venomous, little weapon, with which Providence has armed them, and which generally dreaded little weapon they can use so dexterously, before we can operate upon them for their own good. By means of a very simple apparatus, which may be called a *fumigator*, and which is a contrivance as novel and as useful in the management of Bees, as any of my hives or other inventions, *Bees may be totally subdued without being injured in the slightest degree, and dealt with as if they had neither stings nor wings.*

I beg, however, to re-state distinctly—that, in taking off a box or a glass of honey, *no fumigation whatever is necessary, or ever*

practised by me. It is only in cases such as those just enumerated that I have recourse to it; but in no case for the destruction of Bees. Fumigation, therefore, in my practice, is not suffocation.

The following figure is a representation of a fumigator, which a brief explanation will render intelligible.



This useful article consists of a square top-board upon which is placed a straw-hive (E.) so as to show an open, circular space under the hive and through the square board into the bag below. I need hardly observe—that the straw-hive is no part of the fumigator, but is here represented as standing upon it in order to exemplify its use. The top-board is of inch-deal, and is nineteen or twenty inches square. A round piece is cut out of its centre of not more than thirteen inches in diameter—that being something near to, or perhaps rather more than, the inside diameter of a common hive—so that a hive will stand upon the wooden circumference of the part left, without there being any ledge inside, that is—any part so enclosed by the hive as to catch and detain the falling Bees. From the upper-edge of this circle is suspended a bag, a yard in length, made of glazed calico, the bottom-part of which draws round the rim of a shallow, funnel-shaped, tin Bee-receiver, which Bee-receiver is about ten inches across at the top, and its lower part, or neck (D. or F.) is three inches and a half in length, and its throat (if I may so term it) is nearly three inches in width. To fit this neck, which is thickly perforated for the purpose of admitting fresh

air, when fresh air may be required, is a close lid, just like that of a common, tin canister, to hold up the fumigated Bees, and also to stop the ventilation when not wanted. C. is the fumigating lamp with a perforated top through which the fume ascends, and is made conical, that so a fumigated Bee in its fall cannot rest upon it, and be thereby scorched or injured, as would inevitably be the case were this top flat. The tie (B.) closes the bag and keeps every Bee above until the lamp and every thing below be adjusted, and it is *then* to be untied. The fumigator is here represented as standing upon three legs made fast to the top-board by small bolts, as at A.; but it is quite as convenient in practice, and more portable, if, instead of these legs, it be made like a common scale with a cord from each corner, which may be gathered into a small iron-hook, and thereby suspended from the branch of a tree, or from any other convenient place, when used; the lower part of the bag is represented as being transparent, but that is done purposely to show how the lamp is placed inside when prepared for operation.

By persons inexperienced in such matters, it may be thought to be an extraordinary feat to unite the Bees of one hive with those of

another—to bind, as it were, the legs and wings, and pro tempore to render useless the sting of every individual Bee, until such union be effected. Nothing, however, is more easy; nor is any part of apiarian practice attended with more pleasing consequences to the operator, or with more important and beneficial results to the Bees themselves. When in a state of temporary intoxication from the fume made to ascend through the perforated tin (C.) into their hive, these beautiful insects are perfectly manageable,—perfectly harmless.

This intoxicating fume is caused by introducing into the fumigating lamp a piece of ignited vegetable substance, called puck, puckball, or frog-cheese, or, most commonly, *fuzzball*. It is a species of fungus, or mushroom, and is plentiful enough in the autumn in rank pastures and in rich eddishes. Shepherds, milk-maids, or country-school boys, are well acquainted with them,—know very well where to find them,—and for a mere trifle will easily pick up as many of them as will supply the demands of twenty apiarians. They are frequently as large as a man's head, or larger. In 1826 I had an unripe, white puckball, which weighed ten pounds. When

ripe they are internally of a brown colour, and turning to powder become exceedingly light, and are then properly *fuzzballs*. When you have procured one of these pucks, put it into a large piece of stout paper,—press it down therein to two-thirds, or, if you can, to one-half, of its original size, and tie it up very closely,—and, lastly, put it into an oven sometime after the household bread is drawn, that is, when the oven is nearly cool, and let it remain there all night, or, until it will hold fire, and smother away like touch-wood, i. e. burn without kindling into flame. In this state it is fit for the lamp, and may be used in the manner following:

Take a piece of this prepared fungus, as large as a hen's egg, (it is better to have too much of it than too little to begin with) ignite one end of it with a candle, and then put it into the fumigating lamp,—next fix the lamp in its socket over the Bee-receiver, and place the whole inside the bag, as shown in the plate, and untie B—the fastening round the middle. In a very short space of time the Bees in the hive placed upon the top-board (which is necessarily the first thing to be attended to in every operation of this kind)

will be totally under your control. The operator should be particularly careful to close every vacancy, however small, that there may happen to be between the top-board and the edge of the hive, by tying a cloth round it—the hive—as soon as ever it is placed upon the board. This precaution will prevent the escape of any of the fume, and will also prevent the Bees from annoying the operator during the fumigating process.

In the course of a minute or very little more you will with delight hear the Bees dropping like hail into their receiver, at the bottom of the fumigating apparatus.

When the major part of them are down, and you hear but few fall, you may beat the top of the hive gently with your hands, in order to get as many down as you can. Then loosening the cloth, lift the hive off and set it upon a table, or upon a broad board, prepared for the purpose, and knocking the hive against it several times, many more Bees will fall down, and perhaps the Queen amongst the rest; for as she is generally found to lodge near the crown of the hive, she oftens falls one of the last. If the Queen is not among the Bees on the table, then search for her among

the main body in the Bee-receiver, first, however, putting them upon the table, if you discover her not before lying among the uppermost Bees therein.

During this search for the Queen you must be proceeding in a similar manner with the Bees in the other hive, with which those already fumigated are to be united. As soon as the Bees of the hive last fumigated are all composed and quiet, and you have found and secured one of the Queens, you may put the Bees of both hives together into one, mingling them thoroughly together, and sprinkling them at the same time with a little ale and sugar, then put them and *one only* of the two Queens among the combs of the hive you intend them to inhabit, and gently shake them down into it. When you have thus got all the Bees of your two hives into one, cover it with a cloth and bind the corners of that cloth close about it, and let them stand during that night and the next day, shut or closed up in this manner, so that a Bee may not get out.

In the evening of the following day at the dusk hour, loose the corners of the cloth and remove it from the mouth of the hive, (taking

care of yourself) and the Bees will with a great noise immediately sally forth; but being too late to take wing, they will presently go in again; and ever after remain satisfied in and with their new abode—new at least, to one half of them, and new to the other half also when transferred into a fresh hive, or into boxes.

But in taking away the cloth discretion and caution must be used, because the Bees will for some time resent the affront put upon them by such, no doubt, to them offensive treatment.

The best time of the year for unions and removals of this sort—is after the young brood are all out, or early in the spring before the eggs of the Queen have changed and quickened into larvæ,—I will say—in the month of March; and if the weather is cold, it is advisable to perform this operation in a room where the temperature is about 60 degrees. For if Bees are displaced, that is—taken from their hive, in a cold atmosphere, it is but rarely that they recover from the effects of the fume so as to marshal themselves into working order in a box or new hive. But this they can do, and will do most effectually, under this agreeable temperature. As twelve

hours are sufficient for the Bees to regain their former independency in their new domicile, you may place them at the end of that period on their summer stool. They will then work, as soon as the weather will permit them, as if they had never been removed from their former hive, nor in any way disturbed.

As once witnessing, says Mr. Thorley, an operation of this kind would convey a more perfect idea of the whole performance than the ablest pen can possibly give, if any gentleman, or other person should be desirous of seeing the performance, the author freely offers that, or any other service in his power, in which he can oblige them or instruct them.

The same degree of precaution is not necessary on the removing of the Bees of a cottage hive on my principle; it is only requisite in the particular case of joining or uniting two or more hives together, that such nice management need be observed. And certainly the more expeditiously the whole is performed, the more pleasing will be the result of the operation, and the more certain of success.

I will conclude this subject with an anecdote:—In the year 1828, I was engaged

by the Honourable Lady Gifford, of Roehampton, to join the Bees of two hives together; and as the operation was a little novel to the spectators on that occasion, who consisted principally of the branches of that noble family,—when I had drawn the Bees from the cottage-hive and they were all lying on a white table cloth, and every eye was anxiously intent upon discovering the Queen Bee first; there was some trouble in finding her majesty, even I myself—an old practitioner—had overlooked her, and having occasion to leave the table and my fumigated Bees surrounded by my young Lord and Lady Gifford, and by the rest of her Ladyship's family, her infant son, in the arms of his nurse, eagerly called out—"Mamma, mamma, what is that?" hearing the child's animated expression I returned to the table, and beheld her majesty—the Queen of the Bees,—and her actually pointed out by an infant not three years of age. Is there any excuse then to be advanced for not knowing the Queen Bee? And, as a true description of this Bee and of the noble office she fulfils in the hive, will be given in the course of this work accompanied with a plate of her and of the other Bees, I trust and hope my Bee-

friends will not allow a child of only three years of age to excel them in this knowledge, although that child was the son of a late Attorney-General. Never shall I forget the look of satisfaction that beamed on the countenance of the affectionate mother; to see each of her eight amiable children around the table with her Ladyship, minutely searching every little company of Bees, in order to obtain information of the Queen, was a lovely sight, and to hear her infant son proclaim, as it were, her majesty—the Queen of Bees—by pointing his little, delicate finger to the object of his curiosity, and exclaim—“Mamma, mamma, what is that?” was most gratifying even to me. Well might the little naturalist inquire—“what is that?” when he was in the presence of royalty, and pointing to one of the happiest monarchs in the world, while I myself—an old practitioner, had not previously observed her. Be it so, I acknowledge my oversight in that instance, and feel it incumbent on me to give the merit of the discovery to him to whom on that occasion it was so justly due.

Ye pastors of religion, ye fathers and mothers, ye guardians of the young, but

teach the infant mind to know its sovereign's virtues, and its christian duties, and such infant will grow up into an affectionate and loyal subject, and continue such through life,—and like the happy, busy Bee, will be an ornament to the society to which he belongs, and the pride of our beloved monarch—King William—*Whom may God save!*

CHAPTER X.

SAFETY-BLOCK.

It has already been observed (at page 30) that front-blocks belonging to the floor-box upon which collateral-boxes are seated, may be so constructed that any number of Bees can effect their escape through them on leaving a box stored with honey, without there being a possibility for a single Bee to re-enter to rob the rich magazine. As a particular description of such a block was inadvertently omitted to be given in its proper place, I will *here* devote a short chapter to it.

Whilst explaining to some scientific gentlemen at the National Repository the method to be pursued in the management of Bees in a set of collateral-boxes,—and, in particular, the manner of taking off a box of honey, it was objected—that, on removing the block-

front and withdrawing the tin that opens a communication into the box above, though a passage would thereby be opened for the imprisoned Bees to get away, it would at the same time afford an opening and an opportunity—nay, be a sort of invitation for the Bees of other hives,—for strange Bees and robbers to get in, annoy, and destroy the native Bees, then subdued by having been imprisoned, and to plunder and carry away their treasures.

This objection, to persons unskilled in Bee-matters, may, I grant, appear to be plausible—nay, reasonable: but every *practical apiarian*, who has taken off two or three end-boxes of honey, knows very well that there is not the least danger to be apprehended from robbers or marauders during the short time that the liberated, native Bees are hurrying away as fast as they can get. I have never witnessed any thing like an attempt to besiege and rob a box so situated. Were, however, the communication to be left open for any considerable time after the Bees have departed, I have no doubt that, if not discovered by Bees belonging to other hives, it (the vacated box) would be re-entered by its own Bees, and by them be soon entirely emptied of its honey. Nothing,

however, but down-right carelessness on the part of the operator will ever subject a box of honey to a visitation of this description. But, notwithstanding the conviction in *my* mind that the above-stated objection is *in fact* groundless, I set my wits to work to answer it in a way more satisfactory to the highly respectable persons who raised it, and, if by any means I could, to obviate it entirely. It did not cost me much mental labour to invent—a *safety-block*,—nor does it require much manual labour to make one.

A safety-block must be made to fit the place of the common block, and may be cut out of a piece of half-inch deal board, having one side planed off so as to leave the bottom-edge less than one-fourth of an inch in thickness; then with a three-eighths-inch centre-bit cut as near the lower, that is—the thin edge, as you can, a row of holes. Ten holes in a length of six inches will allow a convenient space between each hole. Next, over each of these small holes, suspend a piece of talc, cut of a proper size for the purpose, by a thread of silk, and make that thread fast round a tiny brass nail above. The talc, which is a mineral substance as transparent as glass, and much

lighter, and on that account much better than glass, thus suspended over each hole, is easily lifted and passed by Bees from within, but is heavy enough to fall again as soon as a Bee has made its exit, and forms an effectual bar or block against the entrance of Bees from the outside. A block of this description may be had for a trifling expense, and is recommended to all such inexperienced and timid—timid because inexperienced—apiarians as are apprehensive of being annoyed by intruders when they are taking off a box of honey. Though this safety-block rather impedes the escape of the Bees, it has nevertheless a pretty appearance when it is neatly made,—and it is amusing enough to see the beautiful, little creatures pushing open first one little trap-door and then another, popping out their heads, and then winging their flight to the entrance of the pavilion. After all, though it certainly is a complete *safety-block*, and was invented to obviate a groundless objection, it is more an article of curiosity than of real usefulness.

CHAPTER XL

OBJECTIONS AGAINST PILING BOXES.

HAVING gone through the explanation of my different hives, and of all my Bee-machinery, I will, previously to entering upon other matters, state my objections to the piling of Bee-boxes one upon another, which is sometimes, and not improperly, called—*storifying*. It is a mode of managing Bees that has been recommended by some modern authors,—principally, if I mistake not, by Dr. Bevan; and it is practised by some Bee-masters, who, I am told, consider it to be the most humane mode, and the only humane mode of managing honey Bees. I have no wish to offend any man, and particularly that man who has exerted himself so much to better the condition of the honey Bee. If he has been mistaken in the *means* to be employed to gain

so desirable an end, and in my humble opinion he certainly has been mistaken, every praise is due to him for his good intentions.

My first objection to the piling system is—because it occasions a great deal of extra trouble, labour, and inconvenience to the Bees, and consequently prevents their collecting so great a quantity of honey and wax as they will do where they are not subjected to these drawbacks. And where, I would fain know, is the humanity in increasing and obstructing the labours of these indefatigable, little insects? Is it not inhumanity to force them contrary to nature to deposit their treasures in a garret, two or three stories high, when a far more convenient store-room may be provided for them on the first floor? Let not, then, the piling advocate of the present day any longer recommend this faulty practice, nor erroneously contend that the elevating of boxes one upon another, is the best and only way of ensuring an abundance of honey and wax. But fairly to get at the merits—not to say—demerits of this practice, I will examine it a little in detail. First, then, the piling practitioner puts a swarm of Bees into a box, which I will call box A. This box, if prosperous, of course soon becomes

a pavilion of nature,—that is, it soon contains quantities of brood-comb, young brood, larvæ, and embryo Bees in various stages of existence. It is allowed to stand alone until it be filled, or nearly filled, with the Bees' works. It requires no great skill to know that the contents of box A. at this period are as just described. When nearly full it is placed upon another box (B.) to prevent what is called the maiden-swarm. This box, like box A. is quickly filled with combs: the Queen too follows her labourers and progressively lays her eggs even to the lower floor. Of course box B. like box A. soon contains quantities of brood. The second box (B.) gets full just as the first did, and as a cottage-hive does—not with pure honey, but with brood, pollen or farina, and other substances, as well as with honey; in short, there is no provision for, nor means of, dividing the works of the working Bees from the works of the Queen Bee; consequently they become, as *of necessity* they must become—one promiscuous mass. The brood continues to increase and occupies that part of the box which should be of pure honey and wax. This goes on until more room is wanted; and *then* it is that the two full

boxes (A. and B.) are exalted and placed upon the third and last box (C.) This, however, does not mend the matter; but, as will be seen presently, it *does* occasion a great deal of additional labour and inconvenience to the Bees. In the meantime they carry on their works of nature and of art—they construct new combs and store some of the cells with honey, and the Queen lays her eggs in others, just as in the other boxes. The fact is—the three boxes soon become as one: they soon become and continue to be of one temperature,—the same compound of the old-hive,—the brood-cells are intermixed with those containing honey,—wreaths of pollen are in every pile,—and animated nature is everywhere peeping from the waxen cells, in which nothing but pure honey should have been deposited. But this is not all, nor the worst part; though bad enough, if *purity of honey* be any consideration.

It is a fact known by me and by every one at all experienced in the management of an apiary, that no sooner are the combs in box C. got into a state of forwardness—it would be saying rather too much to say—completed, than numbers of working Bees are, as it

were, struck off their work there, and set about removing all superfluities and nuisances from the combs lately filled with young brood in the uppermost box A. Every cell in those combs that has been the nest and nursery of a young Bee they cleanse thoroughly and repair, where repairs are needed, preparatory to its being made a receptacle for honey, or for the other treasures brought from the field. At this time, that is—as soon as the combs are free from the first brood, the uppermost box is nearly empty, instead of being full: it contains *empty combs and Bees, but little or no honey*. Here then the Bees are subjected to that extra labour and inconvenience which form my first objection to the piling-plan. From the entrance into box C. through box B. and up into box A. the way, to a loaded Bee, is neither short nor pleasant; it is a labyrinth beset with difficulties and obstructions, in surmounting which much of that time is occupied which would otherwise be more profitably, and we may suppose—far more agreeably employed, in passing from flower to flower, and in culling their various sweets. Any person, it may be presumed, would rather set down a heavy load on

the ground-floor than have to tug it up two or three long flights of stairs, and through intricate, winding passages, and be jostled and impeded and pushed about, and perhaps backward every now and then, by countless crowds of busy men, unceasingly hurrying up and down and passing and re-passing the burdened man in every direction. And is it not comparatively the same with Bees going through boxes C. and B. up into box A.? I maintain that it is so,—and that Bees in piled boxes lose much time in performing the *unnecessary*, climbing labour imposed upon them by their unskilful masters.

The natural consequence of this—I repeat—*unnecessary* waste of their time, must not be placed to the account, or laid to the instinct of the Bees; for of all creatures in the world, Bees perhaps work with the most extraordinary celerity. The beautiful piles of honey, and, *when unobstructed*, the regular movements of these wonderful insects, are admirably scientific and correct. The consequence, namely, a deficiency in the quantity of honey and wax, is chargeable solely to the account of the unskilful manager.

At length the time arrives when the three piled boxes are, or are supposed to be, well

stored,—and when a part of the Bees' treasure is to be taken as a remuneration for the *care* and trouble of the proprietor. Let him then put on his grotesque Bee-dress, and booted up to the middle and gloved to the very elbows, let him proceed to take the uppermost box. He divides it from that on which it stands, that is—from box B. by a slide or a divider of some sort prepared for such an operation, or in any way he pleases, for that I leave to him. Well, he succeeds in getting off his prize; not, however, without the destruction of a considerable number of Bees: for *to presume* that he is acquainted with my easy mode of taking away a box, would be to presume too much; I therefore allow him a Bee-dress at once, and have accoutred him in the best way I can for his arduous undertaking. The box, then, is off. He turns it up and examines it, and, to his great disappointment, he finds that the combs are discoloured, that each pile of the expected treasure contains parts of the young larvæ, and that there is much pollen commingled with the other substances in the box; in short, he finds that the whole is dirty and filthy in appearance; and that he has destroyed a part of the most valuable brood for another year. And, if instead of box A.

he take box B. he will fare little, if any, better; nay, he will in all probability destroy a greater quantity of brood: and in box C. he cannot expect to find more than half-filled cells, or empty combs. Such are the fruits and profits of the piling-system of Bee-management. There are Bee-masters resident within twenty miles of the good town of Spalding, and in many other places that might be mentioned, who know that the foregoing account is true, *lamentably true*: but, until such practitioners are sensible of the faultiness of their system of Bee-management, it would be folly in me to appeal more directly to any of them for a confirmation of what *I know* to be the truth. How, I would ask, can the Bees' sweet treasures be divided from their other work, if there be no means of varying and regulating the temperature in their hive? Without the aid of ventilation it is, in my opinion, impossible; but with it, it is perfectly easy, perfectly safe, and not at all distressing nor even unpleasant to the Bees.

Before I take my leave of the piling or storifying practitioner, whom I consider, as perhaps he may consider me, to be very, very imperfect in the management of Bees, I feel

it to be my duty to my readers, and of course to the piling Bee-master, if he should vouchsafe to me a reading, to record a few other facts that bear strongly against the piling practice—facts derived from long and attentive observation of the nature and habits of honey Bees. Ten years' steady practice and constant attention to the movements of these ingenious insects are the foundations I have to build upon. Besides I have proofs, well-authenticated, indisputable proofs, of the abundant produce of honey having been taken from collateral-boxes, and that of very superior quality too; which honey I take from the Bees as being a superabundant store, and not as a part the taking away of which has any tendency to weaken, or in any way to injure the prosperity of the colony from which it is taken. But what do we behold when a box is taken from a storied pile?—what that in the least deserves to be termed humanity? Do not a thousand murders stare us in the face? Why should the operator be veiled and muffled up and made sting-proof, if no conflict was expected—if no deeds of violence were anticipated? But violence is anticipated, and practised too, to such an extent that it is no uncommon

occurrence for the Bees that escape destruction to desert the other boxes altogether. This ends one part of the business.

And these objections against the practice of storifying boxes will, I trust, induce the reflecting, ingenuous reader to turn his attention to the importance of ventilation in collateral-boxes. By dividing the interior temperature of the hive, suitable and generative heat is confined to the pavilion, that is—to the mother-hive, which heat causes the Queen to propagate her young in the pavilion—this being the middle box, and near the entrance, a great advantage is thereby afforded to all the Bees passing in and out, which fully demonstrates the necessity of their labours being assisted in the breeding-season, *and not obstructed.*

It is the heat which causes the working Bees to deposit their pollen in the immediate vicinity of the seat of nature. This pollen, which is called by some writers Bee-bread, is gathered and deposited for the special purpose of supporting the young larvæ, while helpless insects, or babies, as it were, in the hive. Combined with heat, it is this material which discolours the much admired works of the

Bees; it is this which also makes the wax and honey yellow; besides where this pollen is deposited by the Bees, there, or in that part of the hive, will the Queen lay her eggs,—and there of course propagate her species. And as animal nature advances to perfection, so rises the interior temperature of the hive, until an almost suffocating heat obliges the Bees to leave their home. This heat extends itself to the most remote parts of their domicile; and were it not for the influence of ventilation, a discolouration of their beautiful works would also be extended through the hive, and the Queen would lay her eggs promiscuously as she does in the cottage hive. But this mischief is corrected by ventilation: can then any reasonable man deny its powerful and useful effects in the management of Bees?

The Queen Bee is but seldom seen by the most acute observer; she loves to propagate her young in secrecy, at the regular temperature of the hive at her own birth. If she can possibly avoid it, she will not lay her eggs where human influence can overlook and examine her movements; consequently the ventilation in the side-boxes prevents her extending her works of nature beyond the limits of her native heat.

As soon as she feels a cooling change of temperature, she immediately withdraws to her native clime, and leaves her working subjects to store the beautifully white combs with the purest chrystal sweet. But, were the Queen permitted, as she is in the piling system, as well as in the cottage-hive, to follow her subjects through the common-wealth, with one and the same temperature throughout, she would most certainly propagate her young just as she does in the piled-boxes. In that case there would be no advantage derivable from the purity of the honey; again, on my plan, the middle-box is so situated, that the Queen in it is placed conveniently to superintend her labourers; her eye can behold them in the throngest of their labour, being so near the well fortified entrance of her pavilion. In such a favourable situation, she can view the movements of her subjects, and not a moment need be lost, because all their streets and passages are short. The full extent of elevation in my boxes is not more than sixteen inches: so that in one day, when the honey-dew is plentiful, ten thousand Bees will gather more treasure than ten times that number on the piling system.

These partly repetitions of what has been stated before, I am aware, are conveniences which collateral-boxes possess, and which *do not belong to piled-boxes*. In piled-boxes Bees are subjected to unnecessary labour, which is so far a waste of time. From piled-boxes not nearly the quantity of honey and wax is procured, that may be procured from collateral-boxes,—nor is that deficient quantity of a quality at all comparable with the other. In managing piled-boxes many Bees are destroyed.

These are my objections to that system of Bee-management; and I put it to every person who has practised storifying, to say whether they are not well-founded.

CHAPTER XII.

HONEY BEES.

THAT branch of natural history which treats of INSECTS is called entomology. And Linnæus, the celebrated naturalist and botanist, and the father of the classification of animated and vegetable nature, has divided insects into seven orders, the fifth of which is termed hymenoptera, and includes all those insects that have four membranous, gauze-like wings, and that are furnished with a sting, or with a process resembling one. To this class the honey-Bee belongs. It has, however, been so repeatedly described by naturalists and by apiarian authors, that it would be difficult to say any thing respecting it as an insect merely that has not been said before. It is, moreover, so universally known, that it may seem to be a superfluous undertaking to attempt to describe it at all. As, however, my little work might

be deemed to be imperfect without some account of it, I will present to my readers the substance of what appears to me to be a condensed, well-written article on the Bee. It is from Watkins' Cyclopædia.

There are, he says, and I believe it, fifty-five species of Bees. The general characteristics of the Bee are these:—its mouth has two jaws, and a proboscis enfolded in a double sheath; its wings are four, the lower or under pair of which is smaller than the upper pair; in the anus of the female and working Bees is a concealed sting. Of the fifty-five species, the HONEY BEE—classically, or at any rate entomologically—*apis mellifica*, is the most interesting and important, and that with which I am directly concerned. Of this Bee there are three kinds—the Queen, the drone, and the working Bee; it is no more than justice to the draughtsman and to the engraver to say—the following are beautiful representations—excellent likenesses.



- Fig. 1. represents a Drone.
 — 2. — a working Bee.
 — 3. — a Queen Bee.

The *Drones* are larger than the others; their heads are round, eyes full, and their tongues short; they are also much darker, and differ in the form of the belly; they have no sting, and they make a greater noise in flying than the common Bees. Generally speaking, they are found in hives from the beginning of May to the middle or latter end of July: sometimes they may be seen earlier, especially in good stocks; and sometimes their destruction does not take place till the middle of August, or even later. They neither collect honey nor wax. It has been supposed that their office is to impregnate the eggs of the Queen after they are deposited in the cells; but according to Mr. Bonner, this *supposition* is a mistake. In this I agree with him, and beg to remark—that in no case is a *supposition* a proof. Bonner says that the Queen lays eggs which produce young Bees without any communication with the drones. He supports this position by the statement of several very exact experiments. In this opinion he is supported by the respectable evidence of Schirach. On the

mysterious subject of the Queen's impregnation I am inclined to coincide in opinion with Huber, whose multiplied observations, and various and curious experiments, do render it highly probable that the Queen is impregnated by the drone, not whilst in the hive, but whilst flying in the air: but of this debatable subject, more by and by.

The QUEEN BEE is easily distinguished from other Bees by the form, size, and colour of her body. She is larger, longer at least, and her wings are shorter, in proportion to her size, than those of other Bees. The wings of drones and of common working Bees cover their bodies, but those of the Queen scarcely reach beyond the middle. Her hinder part tapers more than the corresponding part of other Bees, and is admirably adapted for the purpose of being introduced into the cells to deposit her eggs, which she does without being incommoded by her wings, as she no doubt would be, were they long in proportion to the length of her body. Considering then the office she has to perform, the shortness of her wings, and the length and tapering of her body, are alike conveniences to her; her belly and legs are yellower, and her upper parts

darker than those of other Bees. Though furnished with a sting, she very rarely uses it, and will bear being handled without being provoked. A young Queen is smaller than a full grown one. When three or four days old, she is quick in her motions, but when impregnated, she becomes heavy. The common or working Bees have the faculty or instinctive power of raising a Queen Bee, when they are in want of one, from an egg in a common cell. To do this, they choose a common cell in which is an egg, and inject a thick white liquid matter from their proboscis, they then build on the edges of that particular cell and enlarge it; on the fifth day the royal maggot appears in the form of a semicircle, in which form it swims in the midst of the matter in the cell; and on the seventh day it is sealed up; during which period the embryo Queen undergoes various metamorphoses. On the fourteenth or fifteenth day afterwards it comes forth a perfect Queen Bee. Schirach has discovered a method of multiplying Queen Bees to almost any extent, and consequently of making artificial stocks. This can only be successfully accomplished when there are in a hive eggs, nymphs, and little maggots, two or

three days out of the cell, that is, when there is in a hive young brood in these three different stages of existence. When a Queen dies and the Bees are left without the means of raising another, that is—when there are no eggs nor young brood of a proper age in the hive, the Bees cease working, consume the honey, fly about at random, and if not supplied with another Queen, soon dwindle away; but if supplied with a new Queen, they revive, and exercise their labour with new and increased activity. The Queen is, as it were, the very soul of the hive. It has been computed that the ovary of the Queen contains above 5000 eggs at once, and that in the space of two months she may produce 10 or 12,000 Bees. I am inclined to think that this computation is too limited: from what I have witnessed in my observatory-hive this summer, I am led to conclude that a fertile Queen is capable of laying far more than the before-mentioned number of eggs in the space of two months.

The *working Bees* are considerably smaller than either the drones or the Queen. They, like the others, have four wings, which enable them to fly with heavy loads. They have six legs, of which the two foremost are the shortest,

and with these they discharge themselves of their loads. The two last or hindmost are the largest, and on the outside of the middle joint of these is a cavity in which the Bees collect the materials for wax, which materials they carry home to their hives; this hollow is peculiar to the working Bee. Each foot terminates in two hooks. The honey-bladder is of the size of a small pea, and very transparent. The sting is horny and hollow, through which the poison is ejected. The wound inflicted by it is mortal to many insects; and instances are not wanting of horses and cows having been stung to death by Bees. When the sting is left in the wound, and being barbed it commonly is left there, the Bee that loses it dies in consequence.

With regard to the age of Bees, the drones have a short life, being destroyed annually by the working Bees; these—the workers—are supposed by some to live but one year, but others are of opinion that they live several years: those of them that escape a premature death will live, if I mistake not, three or four years, or even longer. I once clipped one of the wings of a Queen, so that I could identify her, in case I should ever meet with her again:

I then returned her to her hive, and had the good fortune to see her several times afterwards during three successive years. Of course she lived more than three years. What became of her at last I do not know; nor whether she may not still survive I do not know. If, however, working Bees be as long-lived as Queen Bees, and I think it will be difficult to assign a good reason why they should not, they *may* live to be three or four years of age, and perhaps more than that. The ample provision they make for life seems to me to be a *natural* indication that they expect at least to live to have occasion for it. Sometimes fierce, destructive battles take place between the Bees of different hives in an apiary, and when the Queen of one hive is killed, the war ceases, and the surviving Bees of the two hives unite and become one peaceable stock.

Some apiarians have obtained an extraordinary command over Bees, particularly Mr. Wildman, who could command a whole swarm to settle just where he pleased—on his chin, on his head, on his hand, or on any particular branch of a tree; but these facts, so surprising to the beholders, he effected, as

any other dexterous person may, by getting possession of the Queen Bee, and placing her where he intended the Bees should settle; for it is a well-ascertained fact, that such is the attachment of Bees to their Queen, that they will congregate around her, and, as far as they can, protect her in whatever situation they find her. Were the attachment and *allegiance* of all subjects to their legitimate sovereigns thus true and powerful, it would, as Sterne says, be something!

In working, the Bees are said by some, whose sayings are perhaps more fanciful than correct, in the following instance at least;—it has, however, been *said*—that in working, the Bees form themselves into four companies, one of which roves the fields in search of materials for the hive, another is employed in laying out the bottom and partitions of the cells, the third in smoothing the inside from the corners and angles, and the fourth in bringing food for the rest. According to this account some are labourers, others are builders, others finishers, and others purveyors. As there is no difference in the formation of the workers, I see no reason for assigning them any particular task or sort of work, nor do I think

the allotment of labour just mentioned rests upon any other foundation than that of vague conjecture. Their diligence, however, and activity, are so great, that in a favourable day they will make cells which lie on each other sufficient to contain some thousands of Bees. To keep their habitations—their hives, close and tight, they make use of a resinous gum, which the ancients called, and which is still called—*propolis*. This substance is at first soft and pliable, but becomes firmer every day; when it has acquired its proper consistency, it is harder than wax and is an excellent cement. They guard against the entrance of ants and other inimical insects into their hive, by gluing or filling up with this propolis the smallest inlets; and with it they fasten the edge of their hive to its floor in a very secure manner. Some Bees stand as sentinels, and mount guard, as it were, to prevent the intrusion of strangers and enemies. But if a snail, or other reptile, or any large insect, forces its way into the hive, they first kill it, and then coat it over with propolis, to prevent being annoyed by the noisome smell, or by the maggots which might proceed from its putrefaction, if left to putrefy. Bees can perceive the approach

of bad weather, for when black clouds are in the sky indicating rain, they immediately hurry home with the greatest speed; and when to the eye of man there is no visible token of a sudden shower, or other immediate change from fine weather to foul, Bees are aware of it, and by their sudden, hurried return to their hives, are the first to prognosticate a change as near; nor, often as I have observed them, have I ever found them wrong in this respect. The manner in which Bees rest when they settle after having swarmed, and frequently in the hive also, is by collecting themselves into a cluster, and hanging to each other by the hooks of their feet. When the weather has been warm, I have frequently seen them presently after being admitted into an end-box, hang in catkins or ropes: this they no doubt do to cool themselves the more. To view the Bees suspended from one another in these single ropes is a natural curiosity well worth attention. The flight of Bees when swarming is singularly rapid and most extraordinary: during some minutes after having risen into the air, they dart across each other in every conceivable direction, wheel round and shoot through the merry crowd again, again wheel round and

again dash through; and notwithstanding the very limited space within which they confine their gambols on these occasions, they never seem to come in contact or to clash with each other; though animated and excited to a degree of apparently frantic ovation, I never have observed one Bee fall foul of another, and this it is that strikes me as being wonderful. The balls attached to the legs of Bees returning to the hives, consist of a powder gathered from the stamina of flowers, not yet brought to the state of wax. The Bee, when it enters the cup of the flower, rolls itself till its whole body is covered with the yellow farina that is therein. It then brushes off this powdery farina with its hind legs, and kneads it into two balls or small pellets, loaded with which it returns to the hive. Bees powdered all over with farina may frequently be seen entering their hive: the Bees thus covered carry their loads upon their whole bodies, without the labour of packing them upon their thighs. Probably when farina is collected in the immediate vicinity of their hives, Bees may have the wisdom (I know not what else it can be properly called) to save themselves the labour of brushing and making

it into pellets. Some authors hold that this substance is eaten by degrees, and being digested in the body of the Bee, that it becomes wax,—or that by some peculiar process it certainly is converted into wax,—and that when there is a superfluous quantity of this undigested, or unmanufactured matter, it is laid up in store, and is called *Bee-bread*. For my part I am of opinion that farina is stored up purely as Bee-bread and food for the young brood, and that *it enters not into the composition of wax*. The material of which wax is formed I take to be quite distinct from farina—a material of a different nature.

The following account of a working Bee appeared in the Farmers' Journal some time ago, I subjoin it, because, in some respects, it is more particular than that just given; but in one thing it is deficient—it makes no mention of the eyes—the two luminaries or lights of the body. The eyes of Bees are of an oblong figure, black like jet, transparent and immoveable.

BEE, says the Farmers' Journal, a small and well known insect, famous for its industry. This useful and laborious insect is divided by two ligaments into three parts or portions,—

the head, the breast, and the belly. The head is armed with two jaws and a trunk, the former of which play like two jaws, opening and shutting to the right and left; the trunk is long and tapering, and at the same time extremely pliant and flexible, being destined by nature for the insect to probe to the bottom of the flowers, through all the impediments of their chives and foliage, and drain them of their treasured sweets: but were this trunk to be always extended, it would prove incommodious, and liable to be injured by a thousand accidents; it is therefore of such a structure, that after the performance of its necessary functions, it may be contracted, or rather folded up; and besides this, it is fortified against all injuries by four strong scales, two of which closely sheath it, and the two others, whose cavities and dimensions are larger, encompass the whole. From the middle part or breast of the Bee grow the legs, which are six in number; and at the extremity of the paws are two little hooks, discernible by the microscope, which appear like sickles, with their points opposite to each other.

The wings are four, two greater and two smaller, which not only serve to transport

them through the air, but, by the noise they make, to give notice of their departure and arrival, and to animate them mutually to their labours. The hairs with which the whole body is covered are of singular use in retaining the small dust that falls from the chives of the flowers. The belly of the Bee consists of six rings, which slide over one another, and may therefore be lengthened or contracted at pleasure; and the inside of this part of the body contains the intestines,—the bag of honey,—the bag of poison,—and the sting. The office of the intestines is the same as in other animals. The bag of honey is transparent as crystal, containing the sweet juices extracted from the flowers, which the Bee discharges into the cells of the magazine for the support of the community in winter.

The bag of poison hangs at the root of the sting, through the cavity of which, as through a pipe, the Bee ejects some drops of this venomous liquor into the wound made by the sting, and so renders the pain more excessive. The mechanism of the sting is admirable, being composed of two darts, inclosed within a sheath that tapers into a fine point, near which is an opening to let out the poison;

the two darts are ejected through another aperture, which being armed with several sharp beards, like those of fish-hooks, are not easily drawn back again by the Bee; and indeed she never disengages them if the wounded party happens to start and put her in confusion; but if, when stung, one can have patience to continue calm and unmoved, the stinging Bee clinches those lateral points, round the shaft of the dart, by which means she recovers her weapon, and gives less pain to the person stung.

FOR THE STING OF A BEE.

The poisonous liquor which the stinging Bee infuses into the wound, causes a fermentation, attended with a swelling, which continues sometimes several days; but that may be prevented by immediately pulling out the sting, and enlarging the puncture, to let the venomous matter have room to escape.

Many nostrums have been recommended as cures—*infallible cures*, of course—for the sting of a Bee, three or four of which I will just mention; premising, however, that I myself never make use of any of them; for, if by chance a Bee happen to sting me, which

is very rarely indeed the case, though I never so much as cover my face, nor even put on a pair of gloves, when operating among thousands and tens of thousands of Bees, I extract the sting instant, and never afterwards experience the least pain, nor suffer the slightest inconvenience. But if the sting be suffered to remain in the flesh, during a few seconds only, it is not very easy to stop the inflammation and to allay the pain. An onion cut horizontally into thin slices, and pressed closely to the wounded part, and renewed at short intervals, has been accounted a good application. If the part stung be first well-rubbed with one of those slices, that would perhaps have a soothing effect. The juice of the plantain is also said to be a specific; olive oil is another; so is common salt; so is laudanum; and so is chalk, or whitening. Pressure with the hollowed end of a small key, or with a pencil-case is practised by some unfortunates, and is said to check the circulation of the poison. Accidents may sometimes happen, and the most humane apiarian may occasionally receive a sting; but gentle treatment does not irritate Bees; and when not irritated, they have no disposition to use their stings.

CHAPTER XIII.

IMPREGNATION OF THE QUEEN BEE.

NOTWITHSTANDING the most persevering attention of Huber and of other ingenious apiarians, and notwithstanding the experiments and expedients had recourse to, to discover the secret, it is still doubtful—it is still undiscovered, in what precise way the Queen Bee becomes impregnated. No one has ever yet witnessed the fact of her copulation with a Drone, either in the hive or elsewhere,—in all probability no one ever will be witness to it; consequently the contradictory conclusions apiarians have come to on this subject are unsatisfactory, because unsupported by sufficient and convincing proofs. Huber, after having made a variety of observations, and tried numberless experiments, to get at the fact, gives it as his opinion—that the impregnation

of the Queen is accomplished by her intercourse with the drone, during a flight in the open atmosphere; but modestly states that he never witnessed the act of copulation. On this last point I entirely coincide with him; and firmly believe that no man ever yet has been present to confirm the supposed fact; neither can any person deny the possibility—not to say—the probability of such an union. On the other hand, Mr. Huish is an advocate for the drones in another way, stating them to be the male Bees, and that they fecundate—not the Queen, but all the eggs of the Queen, produced by her, during the year in which the drones are brought into existence. But Mr. Huish has nowhere stated, in his much admired treatise on Bees, what fecundates those eggs of the Queen which are produced by her in the absence of the drones. It is well known that those eggs do well and come to perfection, long after the drones have ceased to exist in the hive. *Eggs are laid and matured into Bees when there is not one drone in the hive.* This, therefore, is an argument in favour of Mr. Huber's opinion,—namely—that the Queen once impregnated remains so during her life,—and that, as the Queen lives some years, the drones are called

into being to fecundate the young Queens, brought into existence for purposes that will be noticed in the next chapter. Neither should we overlook the singular services of the short-lived drones in other circumstances of the colony; for most essential is their presence in the hive during the months of May, June, and July. Do we not in those months behold the extraordinary rapidity with which the working Bees leave their hive in search of materials for their various works? So indefatigable are these admired insects, after enriching their commonwealth, that in the time of honey-dews, scarcely a mechanical labourer is left in the hive. Now, were it not for the drones—those large bodied Bees—what would become of the young larvæ then in existence? It would undoubtedly perish. No sooner, however, is this busy season at an end, than the total destruction of the drones takes place; but not until the animal heat which the drones impart to the hive has accelerated the production of the young Bees, and added thousands of them to the mother hive.

It is not possible that the drones can influence the impregnation of the Queen's eggs, particularly those eggs which are produced

after the total destruction of the drones, which generally takes place in August, and sometimes in the latter end of July. These later eggs are hatched and brought to a state of perfection by the crowded population of the hive at that period: for a sufficient number of common Bees, that is—a well-populated hive, will always bring to perfection the Queen's eggs that have been deposited in the cells, after the total destruction of the drones. This seems to prove that there is some probable truth in Huber's opinion respecting the agency of the drones in the procreation of Bees, by their sexual union with the Queen. Though I was once inclined to differ in opinion with Huber on this subject, and even went so far as to venture to say with Huish, and in Huish's own words—that the Queen knows not cöition, and that she is both virgin and mother,* from what I have seen in my observatory-hive this summer (1832) I am led to doubt the accuracy of that remark, and am disposed to lean to Huber's doctrine, and to think that there *may be* more truth in his experiments than has hitherto been awarded to them: in short, I see no objection to Huber's theory, although there is no direct proof of the copulation of

* See pages 13, 14, antea, and Huish on Bees, page 18.

the Queens with the drones. All apianians allow that there are male and female in a hive or stock of Bees;—all admit—indeed, it is impossible to deny—that Bees *do increase and multiply* at a prodigious rate, and so fulfil the Divine injunction; the only question to be solved is this—*How* is the Queen Bee impregnated? This secret in nature—if those matters, or natural operations, which we cannot clearly explain, which, though in themselves sensual and gross, may, nevertheless, be too subtile, too refined, for our obtuse understandings to comprehend, and for our dull faculties to investigate,—if these may be called secrets in nature, there is a secret of this description respecting the sexual union of Queen and drone Bees, or, at any rate, respecting the manner of the impregnation of the Queen Bee. I condemn no man who differs from me on this nice subject, as I have no direct proof, either that Huber is right, or that Huish is wrong, in their surmises relative to this disputable matter. Individually they are men deserving the highest respect; their labours and perseverance to throw light upon this mystic branch of apianian science deserve the utmost praise; as also do the labours of the learned and ingenious Dr. Bevan,

whose treatise on Bees I have read with much pleasure, and have occasionally referred to, and shall again make use of it, in this my humble attempt. We have all exerted our best abilities to become the favourites of our patrons and friends. How much each of us deserves the honours conferred on us, is best known to those who have been most benefited by our unceasing endeavours to improve and extend the apiarian science. My great object is—not to dispute with the naturalist, the philosopher, or with the apiarian, *how* the Queen Bee becomes impregnated: because, be *that* as it may, it is, no doubt, consistent with the law of nature,—it is, no doubt, a part of that all-prevailing law; and though hitherto undiscovered,—hitherto “one of nature’s gambols with the human mind,” I do cherish strong hopes that the observatory-hive I have constructed will on some auspicious, future day, disclose such facts as will set the matter at rest for ever: my great object at present is—to endeavour to improve the culture of honey Bees, and to lay before my readers *practical* instructions for the more humane and more profitable management of those interesting little insects.

CHAPTER XIV.

SUPERNUMERARY QUEENS.

IN the last chapter we were at sea without a compass by which to steer our course aright,—with two pilots on board, 'tis true; one of them a foreigner, *experienced* beyond most other men, though aged, and infirm, and defective in his eyesight, but willing, nevertheless, nay —anxious to conduct us to our wished-for haven; the other, though not inexperienced, less practised, it is thought, in voyages of discovery, and more venturesome than his senior in the office, contending that the respectable, old gentleman had put us on a wrong tack,—that we were in a wrong latitude, —that our reckoning was incorrect, and even making merry with the old man's infirmities. Perplexed, and doubting in whom it is most reasonable and safe to confide, we seize

the helm ourselves and make to the nearest shore, and luckily land on terra firma—terra cognita, and are now approaching a *field* with every corner of which we are thoroughly acquainted. But metaphor apart, lest we should not properly sustain it.

There is but one reigning Queen in a colony of Bees at one time: but previously to swarming, royal cells are constructed, and provision made, for ensuring a successor to the Queen that leads the swarm, and emigrates, when the too-crowded population, and over-heated temperature of the hive, render such emigration necessary. That it is the old Queen that leaves the hive with a swarm I am well convinced, notwithstanding what some apiarians assert to the contrary. To satisfy myself on this point I have sometimes in the evening of the day on which a hive has swarmed, at other times on the second, and at others on the third day after that event, put the parent-stock under, or rather, I may say—*over* fumigation, dissected and examined the combs and Queen-cells minutely, and the Bees also, and whenever I did find a Queen, she was invariably a young one; but, instead of a Queen, I have more frequently found a royal cell just ready

to give birth, as it were, to a successor to that which had left the hive; and in general there are several of these royal cells containing embryo Queens in different states of forwardness: so that it seems Bees have an instinctive foresight which leads them to provide against casualties, for they are generally provided with the means of bringing forth *supernumerary Queens*, so that, in case the first that comes forth should prove sterile, should be defective, or in any way unfortunate, or unfitted to assume the sovereignty of the hive, there may be others ready to burst into being, and remedy the misfortune that would ensue, were there but one chance of a successor, and were that one chance to prove abortive. But no sooner is a young Queen enthroned, as it were, and established in the government of the hive, than the supernumerary ones, in whatever stage of existence, are all discarded, and cast out of the colony. Mr Porter, of Cowbit, has this year (1832) picked up eight of those discarded, virgin Queens, together with the old Queen, which last was sorely mutilated, *but not killed*—she alone was cast out alive, the others had been killed: these nine supernumerary Queens were all cast out of one fine colony of Bees in

the course of two successive days. That colony is a remarkably prosperous one, *and has not swarmed*. I myself have observed no fewer than twenty-four supernumerary, virgin Queens, that were cast out of one of my stocks; and that stock is flourishing, *and has not swarmed*: and my respected friend, Mr. Salmon, of Stokeferry, informs me that he once collected upwards of thirty of these young Queens; whether his stock swarmed or not I am unable to state positively, but presume it did not; for, generally speaking, when supernumerary, virgin Queens are cast out of a colony, it may be considered as an indication that that colony is not only prosperous, but that swarming is not contemplated—in fact, is abandoned for that season. The question then is—how are Bees to be managed in order that they may be induced to rid themselves of these supernumeraries? The relation of the following practical lesson, will both answer the question, and exemplify and confirm the foregoing remarks.

It has already been related (in pages 60—64) that in 1826 I forced a colony of Bees to swarm,—that I returned that swarm to its parent-stock, and managed so as to prevent

its swarming in future,—and that two royal nymphs were cast out on that occasion. To prove whether I could not accomplish the same object, and prevent swarming altogether, I had recourse to the following experiment.

On the 27th of June 1827, at one o'clock p.m. the thermometer, in one of my colonies of Bees, suddenly rose to 96. The progressive rise and constantly high temperature in that colony during the evening and night, together with the extraordinary weight of the hive, induced me to suspect that swarming, if not prevented, would shortly take place. Not, however, perceiving any of the symptoms that usually precede the immediate act of swarming, I suffered matters to go on until the 6th of July, on which day the thermometer stood at 102. The drones came out and sung their merry tune; and during the whole night the temperature of the colony continued to increase. On the next day unequivocal symptoms of swarming presented themselves. These urged me to push my experiment to the highest pitch of proof; I therefore went on narrowly watching and ventilating this stock, until the 10th of July, when, in spite of my endeavours to keep down the temperature by *merely ventilating*,

the thermometer was standing at 112, consequently I concluded that it was high time to lay this prosperous colony under contribution; and in the evening of that day, I took from it a beautifully finished glass of honey, as pure as the crystal stream; its weight was sixteen pounds. I continued ventilating the side-boxes, and placed an empty bell-glass upon the middle one, whence I had just before taken the full one, I then withdrew the dividing slide, and the Bees immediately entered the glass, and began their works in it, and in four days filled it with comb, and partly filled the cells with honey. On the sixth day after those operations had been performed, a continuance of the former temperature demonstrated to me the necessity of taking away a side-box. I did so, and found its weight to be no less than sixty-five pounds. On removing the box of honey, I re-placed it with an empty one; and on drawing up the tin-slide, in order to admit the Bees into the empty box, to my great gratification I found the thermometer standing at 82 in that box, and in the space of five minutes the other collateral box was under the same agreeable temperature. By this continued ventilation,

within the short space of twenty-four hours afterwards, I ascertained the following important fact,—viz.—that no sooner did the Queen-Bee feel the agreeable change that had taken place in the interior of her domicile, than the royal nymph was expelled from its cradle, and by the Bees brought out of the pavilion, and laid a lifeless corpse on the front-board.

This fact taught me by experiment, that the reigning Queen would very soon, from real necessity, have been compelled to leave the now discarded nymph to take possession of the hive.

The Queen, owing to the excessive and daily increasing heat of the hive, would have left her wealthy colony—would have been compelled to leave it—had not the ventilation, and the enlargement of her domicile, prevented the painful necessity of her so doing. This, I think, proves the truth of the observation—that it is the old Queen which leaves, when Bees are compelled to swarm; but, if not, the following experimental operations have demonstrated the fact. I have united many swarms, and every sovereign Bee I have been under the necessity of making a captive, has invariably been an old one.

On the 25th of June 1828, I took up a parent-stock, four days after it had thrown off a swarm, and *there* found only the royal nymph within its cradle—*there was no Queen left in that stock, save the one in embryo*—the old Queen had gone with the swarm. This lesson caused me to carry my experiments farther. Having taken up the parent-stock, as just stated, I united all the working Bees of that stock to those of the swarm already mentioned, and I also put the young larvæ, found in the parent-stock, to the now united stock; I then placed the intended royal species—the nymph already mentioned—with the remainder of the young brood, in one of the collateral-boxes, and immediately let the odour of the stock through the communicating slide. To my great satisfaction I discovered the willingness of the old Bees to bring to perfection the young they had been compelled to leave in their former domicile. The royal nymph, however, was an exception; she alone was instantly dragged from her cell, and cast out of the hive.

This confirmed the proof of the important fact gained the preceding year,—namely—that ventilation and the means of dividing the treasures of the Bees, by taking off a glass

of a box of honey,—or, if necessary, by taking off both a glass and a box, set aside the necessity for swarming. On all occasions, under this practice, a proper temperature may be supported in a colony; and in all critical points, by a just observation of the state of the thermometer, Bees may be relieved and assisted, and all the mischiefs attending the old mode of management may be guarded against and prevented. For when adequately relieved and properly assisted, they proceed to rid the colony of all embryo Queens, which would only become so many supernumeraries in a hive where the reigning Queen is fertile, and the necessity for emigration is superseded. But, unless Bees could be made to understand that accommodation will be extended to them at the proper time, they, guided by *their* sense of their situation—not by ours—naturally and wisely provide *their own means* of relieving themselves; and in so doing frequently bring forth what afterwards become supernumerary Queens, which are invariably destroyed and cast out of the colony, as soon as the Bees are sensible that they have no occasion for them. And, whenever a royal nymph or a virgin Queen is thus cast out, swarming need not be apprehended.

CHAPTER XV.

BEE-FEEDING.

NEGLECTED generally as is the management of Bees by their cottage possessors, there is no part of it less attended to, nor more slovenly performed, when performed at all, than that of feeding. The cottager commonly takes up, as he terms it, his best hives for the sake of the treasures they contain, or are supposed to contain. This is destroying Bees because they are rich! He also takes up the lightest and poorest—of course the late swarms—and those that are the least likely to live through the winter; because if he get from one of these but two or three pounds of honey, though he seldom gets so much, and a few ounces of wax, he thinks that that is all clear gain: and, if he get neither honey nor wax, he, at any rate, gets rid of the *expense* and *trouble* of feeding

his good-for-nothing swarms, which, in his opinion, however fed, would never come to any good. A pennyworth of brimstone will do the job at once, and is more easily paid for than a pound of sugar, and after that another, and perhaps another. Such is the reasoning, and calculation, and cruel practice of the generality of cottage Bee-keepers! Such is the destruction annually dealt out to hundreds of poor swarms, and thousands and millions of *poor Bees*!! I do from my heart pity and deplore the untimely fate of these suffocated, innocent, valuable insects. To destroy Bees because they are rich is a *barbarous* practice, and ought by all means to be discountenanced and discontinued;—to destroy Bees because they are poor and may need support, is cruel—is inhuman—is shocking, however little may be thought of it by those who still adhere to this practice. Even with the common straw-hives, this terrible havoc among poor stocks and late swarms might be prevented, if they, who happen to have them, would so far improve themselves in the practical management of an apiary, as to be able to fumigate, and take such Bees out of the hives containing them, and to join

them to their richer stock-hives, in the latter end of August, or any time in September. This is by far the best plan that can be adopted with poor hives ; and there really is no difficulty in the operation. This strengthens the population of rich stocks, and causes them to swarm early in the ensuing spring ; *it preserves the Bees*, which is of itself, independently of the advantages accruing from it afterwards, a consideration that never should be lost sight of,—it leaves the contents of the fumigated hive, as absolutely in the possession of the Bee-owner, as if the Bees had been suffocated and destroyed,—and in most cases it entirely does away with the necessity of feeding. I confess I should rejoice greatly, and flatter myself that every friend of humanity would rejoice with me, to see this mode of disposing of weak hives universally adopted ; because, it may be presumed, that the next step in the way of improvement would be to take away the superabundant treasure of the Bees and *still preserve them*.

Notwithstanding, under certain circumstances it will always be necessary and judicious in Bee-masters, to have recourse to *feeding*. If, for instance, after an early swarm is put

into a hive, or into a box, two or three or more cold, ungenial days should follow, and more particularly if those days should happen to be rainy also, by feeding such a swarm you will assist your impoverished labourers, not only with *necessary food*, but with materials and treasure, which, unfortunately for them, they cannot at such an unfavourable juncture get abroad to collect elsewhere.

Different apiarians have adopted and recommended different ways of feeding Bees, none of which, in my opinion, possess any great merit; in order, therefore, to improve this part of Bee-management, my endeavours have been directed to the contrivance and construction of a feeding department; which is attached to my collateral-hives in so convenient a manner, that I can feed my Bees, at any time when feeding is required—in spring, in autumn, or in winter, without disturbing the position of the hive, and without changing its interior temperature; which temperature cannot be kept equable and comfortable, where a hive is frequently lifted up from its stand, and its interior is suddenly exposed to the action of perhaps an extremely cold atmosphere. Besides a hive cannot be lifted up without

breaking the propolis by which it has been cemented all round and made fast to its stool. In sharp, cold weather, disruption of the hive from its stool is a serious mischief done to the Bees; because, however carefully it may be set down again, there will have been made many vents and crevices between the edge of the hive and the stool, which will occasion various currents of air, cold, frosty, or other—proper, or improper—to be continually passing through the lower part of the hive. And should Bees be tempted by food, or urged by hunger, to descend into these currents in sharp, frosty weather, but few of them will get away alive; the keen air acting upon them whilst feeding, paralyzes and kills them. I am an advocate for keeping Bees cool in winter—yes, *cool and still also*: let them not be disturbed nor disunited,—let them not be forced nor tempted to (if I may so say) *uncluster* themselves. I have no objection to a current of air, passing through the lower part of a hive in winter, *provided the Bees be not disturbed—be not exposed singly to its nipping influence*; but I strongly object to the feeding of Bees in such currents, because, in that case, feeding is prejudicial to them. The

cottager seldom protects his hives in winter with any other covering than that which a pot, called a pancheon, whelmed over each hive, forms; capped with this unsightly piece of earthenware, his hives are exposed to all weathers; consequently the less he disturbs them the better. He, therefore, should give his weak stocks *a copious feeding*, in September at the latest,—not molest them during the severity of winter,—but in the spring, as soon as the Bees begin to make their appearance at the mouth of his hives, introduce his wooden trough furnished with *a little* Bee-sirup, and then close up the entrance,—withdraw the trough in the morning, and return it replenished every evening, as long as feeding is necessary. Tearing off a hive at Christmas, and scattering a few ounces of brown sugar upon the stand, and then setting down the hive again, deserves not the name of feeding; though it is all the bounty that is bestowed on some stocks; and is even more than others are treated with. It need not then be wondered at that so many stocks of Bees perish in the winter, and in the spring of every year. *By judicious feeding, at proper seasons, almost any stock of Bees may be preserved: by*

injudicious feeding, at an improper season, even good stocks—stocks that would survive, if not fed at all, nor molested, during the depth and severity of winter, may be seriously injured—may be totally destroyed. The peasant Bee-keeper, however, does not often subject himself to the charge *complimental* of being accessory to the death of his Bees through mistaken kindness.

The sum and substance of my directions as respects Bee-feeding are these:—

1. In spring feed *sparingly*.
2. In autumn feed *plentifully*.
3. In winter *do not feed at all*.
4. Feed swarms, if unseasonable weather immediately follow the act of swarming.
5. Preserve the Bees of weak stocks, and prevent a great deal of the necessity for feeding, by adding them to those that are rich and able to support them. This last is the best and cheapest, nay—it is even a *profitable* method of feeding Bees.

Early swarming, where swarming is necessary as in the straw-hive colonies, is of great advantage to the watchful apiarian, but not to the inattentive and slothful manager. I have seen in a cottager's garden a swarm of Bees on

the 10th of May, which was considerably weaker in the month of August, than was a swarm on the 10th of July, and that solely on account of not being fed and properly attended to.

If early swarms are judiciously fed, and supported by a natural heat within, they will be greatly benefited thereby, and eventually prosper.

But, notwithstanding what has been already said, the cottager may probably ask—"how can I feed my Bees without lifting up their hive?" I again and again request him to examine my collateral box-hive; and he will perceive that he may easily feed the Bees in his cottage-hive in the same easy manner, if he have but ingenuity enough to attach a proper feeder to the stool or floor of his hive.

Mr. Huish advises apiarians to make choice of a fine and warm day in which to feed Bees, he says, the danger to be apprehended from the change of the temperature in the hive will thereby be obviated. This, I grant, is rational and humane, and in some degree a confirmation of my already expressed opinion, respecting the mischiefs resulting from the inconsiderate practice of exposing the interior

of a hive to sudden and extreme alternations of temperature. But it matters not what sort of weather it may be, if my mode of feeding be adopted. I feed my Bees in their native temperature, without disturbing them or exposing their food to the temptation of robbers, which feeding in the ordinary way so frequently encourages, during the spring and autumnal seasons; and it is at these times that Bees stand in most need of assistance.

In the year 1828 I purchased a cottage-hive of a neighbour, it was a large hive, and well-stocked with Bees, but extremely light; I was fearful for the safety of its inmates, and, therefore, placed it over one of my feeders; in order to give them support by feeding, I placed the sirup intended for their food beneath the hive; but to my great surprise the Bees refused to take the proffered bounty. I persevered in my endeavours to induce them to feed for four days, but they would not touch the well-intended boon: I therefore resolved to ascertain the cause of their refusal, and on turning up the hive I discovered that thousands of the Bees were in a dying state, I had the curiosity to take the whole of them out singly. After several hours

particular attention and patient search I found the Queen was dead. I then united the weak, enfeebled Bees to a rich stock, and they nearly all recovered their strength. Their numbers greatly assisted in the labour of the hive to which they were joined. Certain it is, that if any accident befall their Queen in winter, it is total ruin to that stock of Bees: where such a death is discovered, feeding will avail nothing, the Bees dwindle away and perish.

Mr. Huish says—and he is perfectly correct in saying—that there are some persons who defer the feeding of their Bees until the moment they suppose that they may be in actual want. This is a most reprehensible plan; for should feeding be too long delayed, the Bees will become so weak and debilitated, that they will be unable to convey the food into their cells: the food ought to be administered to poor stocks, three weeks or a month before they may be supposed to be in actual want; it will then be conveyed with the greatest despatch into the cells, and the hive will be saved from a death of famine. He then goes on to observe—that some apiarians conceive that the feeding of Bees in the spring renders them lazy and inactive. On what this opinion

is grounded he is at a loss to conjecture, as must be every practical apiarian, for it is in direct contradiction, not only to Mr. Huish's experience, but also to that of many other apiarians. A little food granted to a populous, and even well provisioned box or hive in the spring, is attended with very beneficial consequences. It diffuses animation and vigour throughout the whole community;—it accelerates the breeding of the Queen—and consequently conduces to the production of early swarms, where room is not previously given in order to prevent swarming altogether.

BEE-FOOD.

Artificial food proper for Bees may be made by mixing *coarse*, raw sugar, and good, sound ale, in the following proportions:—

To a quart of ale add a pound and a half of sugar, gently boil them, in a sweet, well-tinned saucepan, over a fire clear from smoke, for five or six minutes, or until the sugar be dissolved and thoroughly incorporated with the ale; and, during the process of boiling, skim off the dross that rises to the surface. Some persons boil these ingredients much longer, and until they become, when cool, a thick,

clammy sirup; this not only diminishes the quantity of the mixture, but renders it rather disadvantageous, to weak Bees in particular, by clogging and plaguing them, if, as they are almost sure to do, they get their legs or wings daubed with it. I prefer sirup in a more liquid state.

For spring feeding I advise—that not more than a pound of sugar be put to a quart of ale, or sweet wort, if it can be obtained, and that a small quantity of common salt be added. By a *small quantity* I mean—a dram or two at the most to a quart of the sirup. Salt, it has been said, is conducive to the health of Bees, and the most efficacious remedy for the dysentery, which sometimes affects Bees in the spring; therefore, it may not be amiss to put a little salt into their food, by way of preventive, rather than to have recourse to it afterwards as a remedy.

Speaking of the substances which are proper for the feeding of Bees, Mr. Huish says*—“he is perfectly convinced that honey alone is very injurious to Bees, as it in general gives them the dysentery.” Whether by this

* Huish on Bees, page 372.

extraordinary passage Mr. Huish has, or has not, subjected himself to the lash of his own ridicule, it would be hypercritical and unbecoming in me to determine. As an apiarian I respect him; in no other character am I acquainted with him. His work on the management of Bees I have read, and have derived information and occasionally assistance from some of its pages. There are in it, nevertheless, several untenable positions; of which I consider the above-quoted passage to be one: and, if what he has remarked somewhat sarcastically, at the foot of a note in page 31, be read in conjunction with this passage, it will be for the candid reader, apiarian, or other, to decide whether Mr. Huish does not, oddly enough, exemplify his own remark in propria persona. It is there said—that “there is no wonder in nature which an apiarian has not seen.” Professedly an apiarian himself, he must have seen some, at least, of *the wonders in nature*, otherwise he never could have been “*perfectly convinced*”—that honey—“*honey alone*”—the very substance which Bees, guided by the instinct of their nature, collect with so much industry, and store up with so much care, for their

subsistence, should be "very injurious to them, and in general give them the dysentery." From this it seems that the substance, which is the natural food for one stock of Bees, is physic for another, if not poison! I cannot but express my astonishment that a gentleman, so acute and experienced as Mr. Huish, undoubtedly is, should have asserted in the most unqualified manner—that "*honey alone* is very injurious to Bees." Were this the fact, rich stocks, and all stocks that subsist upon "*honey alone*" during winter, would "in general" be affected with dysentery in the spring, which certainly is not the case. "In general" rich stocks are healthy and strong in the spring. Poverty is the predisposing cause of dysentery among Bees: a regular supply of their natural—their peculiar food, does not induce dysentery or disease of any sort. Had Mr. Huish analyzed the honey given to Bees as food, and which induced dysentery, he would, I suspect, have discovered that it was not "*honey alone*," but —*medicated honey—honey and brimstone*, or honey strongly tinctured either with brimstone or with tobacco. That honey, tinctured with the pernicious qualities of those substances,

should have a laxative effect upon impoverished, debilitated Bees, is no more than might be expected: but then it is not the honey that has the "injurious" effect, but the essence of the brimstone or of the tobacco that is administered along with it. What effect honey, that has not been stoved and saturated with brimstone or with tobacco, may have upon *weak* Bees, when given to them for *spring food*, I pretend not to determine, because I have never tried the experiment. But I do say that before the arrival of spring, honey, that has been drained or expressed from the comb, undergoes fermentation, and that fermentation may, for aught I know, impart to it physical properties, which in its pure, liquid, unchanged state in the warm hive, it does not possess. I am not chemist enough to venture to assert that it is so, but I think it highly probable that fermentation may alter the properties of honey, and render it injurious to Bees. But fresh, unfermented honey, even that in the blackest and oldest combs—the very refuse, and all such as the cottage-housewife makes into common mead, if spread upon large dishes and placed in an apiary, will be banqueted upon by the Bees

in the most eager manner, and is apparently much enjoyed by them. They soon carry into their hives what they do not consume on the spot, and suffer no inconvenience whatever from the treat. I have feasted my Bees in this way scores of times, and esteem it the very best mode of autumnal feeding, and the most profitable way of disposing of broken combs and refuse honey. "Honey alone" is the natural food of Bees, and if given to them pure and untainted, in its primitive, limpid state, so far from being injurious, it is highly beneficial to them; of this I have not the shadow of a doubt. For autumnal feeding I prefer honey to all other substances, and recommend it as the most proper food that can be given to them.

CHAPTER XVI.

HONEY-COMB.

To excite our admiration of the industry and ingenuity of Bees, we need only take into our hands a piece of *honey-comb*, and examine it attentively. Its neatness, its beauty, its construction, the similarity and exact proportion of its double web of cells, for a honey-comb is, in fact, a web of cell-work on both sides, are most admirable, and calculated to lead the contemplative mind from nature's work up to nature's God.

When a swarm of Bees is put into a hive, or into a box, they immediately set about constructing combs in it, and proceed in their building work with a rapidity that is truly astonishing. The cells that are opposite to each other are advanced alike: the work on one side is just as forward and in the same

state as that on the other side. In the cells first finished the Queen begins to deposit her eggs. In an incredibly short space of time, an immense number of cells is completed, and the Bees store pollen, farina, or Bee-bread, (which are so many names for the same substance) in some of those not already occupied by eggs, and in others honey soon becomes visible: all is activity, industry, and apparently happiness. But, to come to particulars:—

As Dr. Bevan, in the course of his *masterly* chapter “on the Architecture of Bees,” has given an engraved representation of a piece of honey-comb,—and as Mr. Huish also has given a somewhat similar representation, but better than Dr. Bevan’s, inasmuch as it is more varied, and shows the royal-cells in their different stages to more advantage, and the drone-cells likewise;—I cannot, perhaps, do the *honey-comb* so much justice in any way, as by presenting to my reader a copy of Mr. Huish’s piece of comb, which has been *greatly improved* by the skilful hand of my engraver, and by giving along with it Dr. Bevan’s able description. Though after all, a piece of *real comb* to look at and examine, is more beautiful and

far better than any engraving possibly can be, however cleverly it may be executed: and therefore, notwithstanding the plate, I would recommend to my readers to procure a piece of real honey-comb, and, with it in their hands, read the following account, which is chiefly from Dr. Bevan's pen.



Royal cells in different states of forwardness, common cells, and drone cells, are intended to be severally represented in this plate. The

ranges forming the upper half, and marked—
 a. are intended to represent common brood cells and honey cells—most of them in an empty state. The lower ranges, marked—b. are drone cells, and are represented as closed up, and as they appear when full of brood. Drone cells, when filled with brood and sealed up, present a fuller and more convex surface than the cells containing common brood—these, that is—the cells containing the brood that becomes working Bees, are sometimes flat and even, and sometimes rather concave. The four large cells, attached perpendicularly to the edge of the comb, and marked—c. d. e. f. are royal cells, in different states of forwardness; that marked—c. is similar in size and shape to an acorn-cup, and is supposed to be quite empty; that marked—d. is in a more advanced state, and is supposed to contain a royal embryo, in its *larva* state: the royal cell, marked—e. is considerably lengthened, narrowed, and nearly closed, because the larva it is supposed to contain is about to be transformed into a royal nymph, in which stage of its existence, as it does not require the assistance of nurses or common Bees, it is closed up entirely, as in the royal cell, marked—f. In this closed cell it progresses from nymph to

Bee, and in due time—that is, in about sixteen days from its being deposited as an egg, it emerges a virgin Queen. When the temperature of a hive, or pavilion of nature, is at a proper height—namely, between 70 and 80 degrees, sixteen days is the period nature requires for the production of a Queen Bee,—twenty-one for the perfection of a working Bee,—and twenty-six for a drone Bee. But, as Dr. Bevan very justly remarks, “the development of each species proceeds more slowly when the colonies are weak or the air cool,—and that when the weather is very cold it is entirely suspended.”

But to return from this short, though, it is hoped, not uninteresting digression, into which the explanation of the Queen cells has led us.

“The combs of the bee-hive comprise a congeries of hexagonal cells, formed by the Bees, as receptacles for honey or for embryo Bees. A honey-comb is allowed to be one of the most striking achievements of insect industry, and an admirable specimen of insect architecture. It has attracted the admiration of the contemplative philosopher in all ages, and awakened speculation, not only in the naturalist, but also in the mathematician:

so regular, so perfect, is the structure of the cells, that it satisfies every condition of a refined problem in geometry. Still a review of their proceedings will lead to the conclusion, as Huber has observed, that, "the geometrical relations, which apparently embellish the productions of Bees, are rather the necessary result of their mode of proceeding, than the principle by which their labour is guided." "We must therefore conclude, that Bees, although they act geometrically, understand neither the rules nor the principles of the arts which they practise so skilfully, and that the geometry is not in the Bee, but in the great Geometrician who made the Bee, and made all things in number, weight, and measure.

"Before the time of Huber, no naturalist had seen the commencement of the comb, nor traced the several steps of its progress. After many attempts, he at length succeeded in attaining the desired object; by preventing the Bees from forming their usual impenetrable curtain, by suspending themselves from the top of the hive; in short, he obliged them to build upwards, and was thereby enabled, by means of a glass window, to watch every variation and progressive step in the construction of a comb.

“Each comb in a hive is composed of two ranges of cells, backed against each other: these cells, looking at them as a whole, may be said to have one common base, though no one cell is opposed directly to another. This base or partition, between the double row of cells, is so disposed as to form a pyramidal cavity at the bottom of each, as will be explained presently. The mouths of the cells, thus ranged on each side of a comb, open into two parallel streets, (there being a continued series of combs in every well filled hive.) These streets are sufficiently contracted, to avoid waste of room, and to preserve a proper warmth, yet wide enough to allow the passage of two Bees abreast. Apertures through different parts of the combs are reserved to form near roads, for crossing from street to street, whereby much time is saved to the Bees.

These in firm phalanx ply their twinkling feet,
Stretch out the ductile mass, and form the street,
With many a cross-way path and postern gate,
That shorten to their range the spreading state.

EVANS.

“Bees, as has been already observed, build their cells of an hexangular form, having six

equal sides, with the exception of the first or uppermost row, the shape of which is an irregular pentagon, the roof of the hive forming one of the members of the pentagon.

“There are only three possible figures of the cells,” says Dr. Reid, “which can make them all equal and similar, without any useless interstices. These are—the equilateral triangle, the square, and the regular hexagon. It is well known to mathematicians, that there is not a fourth way possible, in which a plane may be cut into little spaces, that shall be equal, similar, and regular, without having any interstices.” Of these three geometrical figures, the hexagon most completely unites the prime requisites for insect architecture. The truth of this proposition was perceived by Pappus, an eminent Greek philosopher and mathematician, who lived at Alexandria in the reign of Theodosius the Great, and its adoption by Bees; in the construction of honey-comb, was noticed by that ancient geometrician. These requisites are:—

“First, economy of materials. There are no useless partitions in a honey-comb, each of the six lateral pannels of one cell forms also one of the pannels of an adjoining cell;

and of the three rhombs which form the pyramidal base of a cell, each contributes one third towards the formation of the bases of three opposing cells, the bottom or centre of every cell resting against the point of union of the pannels that are at the back of it.

“Secondly, economy of room; no interstices being left between adjoining cells.

“Thirdly, the greatest possible capacity or internal space, consistent with the two former desiderata.

“Fourthly, economy of materials and economy of room produce economy of labour. And in addition to these advantages, the cells are constructed in the strongest manner possible, considering the quantity of materials employed. Both the sides and bases are so exquisitely thin, that three or four placed on each other are not thicker than a leaf of common writing paper; each cell, separately weak, is strengthened by its coincidence with other cells, and *the entrance is fortified with an additional ledge or border of wax*, to prevent its bursting from the struggles of the Bee-nymph, or from the ingress and egress of the labourers. This entrance border is *at least three times as thick as the sides of*

the cell, and thicker at the angles than elsewhere, which prevents the mouth of the cell from being regularly hexagonal, though the interior is perfectly so.

On books deep poring, ye pale sons of toil,
 Who waste in studious trance the midnight oil,
 Say, can you emulate with all your rules,
 Drawn or from Grecian or from Gothic schools,
 This artless frame? Instinct her simple guide,
 A heaven-taught insect baffles all your pride.
 Not all your marshall'd orbs, that ride so high,
 Proclaim more loud a present Deity,
 Than the nice symmetry of these small cells;
 Where on each angle genuine science dwells,
 And joys to mark, through wide creation's reign,
 How close the lessening links of her continued chain.

EVANS.

“Having just adverted to the ingenuity of Bees in thickening, and thereby strengthening the mouths of the cells, it may here be observed—that *additional strength is also derived from the Bees covering the whole surface of the combs, but more particularly the edge of the cells, with a peculiar kind of varnish, which they collect for the purpose.* At first the combs are delicately white, semi-transparent, and exceedingly fragile, smooth but unpolished: in a short time their surfaces become stronger,

and assume more or less of a yellow tint. The deepening of the colour of honey-combs has been supposed, by some, to be the effect of age; and in part it may be: but it is principally owing to the coat of varnish, with which the Bees cover them. This varnish strongly resembles propolis, appearing to differ from it only in containing the colouring material which imparts to wax its yellow hue. The source of this colouring matter has not been discovered: it is insoluble in alcohol, but the manufacture of white wax shows that it is destructible by light. But to return to the construction of the cell-work.

“The pyramidal basis of a cell is formed by the junction of three rhomboidal or lozenge-shaped portions of wax: the apex of the pyramid being situated where the three obtuse angles of the lozenges meet. To the exterior edges and angles are attached the six pannels or sides of each cell. The apex of each pyramidal bottom, on one side of a comb, forms the angles of the bases of three cells on the opposite side, the three lozenges respectively concurring in the formation of the bases of the same cells. This will, I hope, explain what is meant by “each cell separately

weak, being strengthened by coincidence with others." The bottom of each cell rests upon three partitions of opposite cells, from which it receives a great accession of strength.

"As it is desirable that the reader should thoroughly comprehend this subject, I will restate it in other words. The partition which separates the two opposing rows of cells, and which occupies, of course, the middle distance between their two surfaces, is not a plane but a collection of rhombs, there being three at the bottom of each cell: the three together form in shape a flattened pyramid, the basis of which is turned towards the mouth of the cell; each cell is in form, therefore, a hexagonal prism, terminated by a flattened trihedral pyramid, the three sides of which pyramid are rhombs, that meet at the apex by their obtuse angles.

"The union of the lozenges in one point, in addition to the support which it is the means of affording to the three partitions between opposing cells, is also admirably adapted to receive the little egg and to concentrate the heat necessary for its incubation.

"Each obtuse angle of the lozenges or rhombs forms an angle of about 110 degrees, and

each acute one, an angle of about 70 degrees. Mr. Maraldi found by mensuration that the angles of these rhombs, which compose the base of a cell, amounted to 109 degrees and 28 seconds, and 70 degrees and 32 seconds; and the famous mathematician Koenig, pupil of the celebrated Bernouilli, having been employed for that purpose by M. Reaumur, has clearly shown, by the method of infinitesimals, that the quantity of these angles, using the least possible wax, in the cell of the same capacity, should contain 109 degrees and 26 seconds, and 70 degrees and 34 seconds. This was confirmed by the celebrated Mr. Mac Laurin, who very justly observes, that Bees do truly construct their cells of the best figure, and with the utmost mathematical exactness.

“The construction of several combs is generally going on at the same time. No sooner is the foundation of one laid, with a few rows of cells attached to it, than a second and a third are founded on each side, parallel to the first, and so on, (if the season give encouragement to the operations of the Bees,) till the hive is filled with their works; the first constructed comb or combs being always in the most advanced state, and therefore the first to be completed.

"The design of every comb is sketched out, and the first rudiments are laid by one single Bee. This founder-Bee forms a block, out of a rough mass of wax, drawn partly from its own resources, but principally from those of other Bees, which furnish materials, in quick succession, from the receptacles under their bellies, taking out the plates of wax with their hind feet, and carrying them to their mouths with their fore feet, where the wax is moistened and masticated, till it becomes soft and ductile.

Thus, filter'd through yon flutterm's folded mail,
Clings the cool'd wax, and hardens to a scale;
Swift, at the well-known call, the ready train
(For not a buz boon nature breathes in vain)
Spring to each falling flake, and bear along
Their glossy burdens to the builder throng.

EVANS.

"The architect-in-chief, who lays, as it were, the first stone of this and each successive edifice, determines the relative position of the combs, and their distances from each other: these foundations serve as guides for the ulterior labours of the wax-working Bees, and of those which sculpture the cells, giving them the advantage of the margin and angles already formed.

“The expedients resorted to by that ingenious naturalist, Huber, unfolded the whole process. He saw each Bee extract with its hind feet one of the plates of wax from under the scales where they were lodged, and carrying it to the mouth, in a vertical position, turn it round, so that every part of its border was made to pass, in succession, under the cutting edge of the jaws; it was thus soon divided into very small fragments; and a frothy liquor was poured upon it from the tongue, so as to form a perfectly plastic mass. This liquor gave the wax a whiteness and opacity which it did not possess originally, and at the same time renders it tenacious and ductile. The issuing of this masticated mass from the mouth was, no doubt, what misled Reaumur, and caused him to regard wax as nothing more than digested pollen.

“The mass of wax, prepared by the assistants, is applied by the architect-Bee to the roof or bottom of the hive, as the case may be; and thus a block is raised of a semi-lenticular shape, thick at top and tapering towards the edges. When of a sufficient size, a cell is sculptured on one side of it, by the wax-working Bees, who relieve one another in

succession, sometimes to the number of twenty, before the cell is completely fashioned. At the back and on each side of this first cell, two others are sketched out and excavated. By this proceeding the foundations of two cells are laid, the line betwixt them corresponding with the centre of the opposite cell. As the combs extend, the first excavations are rendered deeper and broader; and when a pyramidal base is finished, the Bees build up walls from its edges, so as to complete what may be called the prismatic part of the cell. Every succeeding row of cells is formed by precisely similar steps, until there is a sufficient scope for the simultaneous employment of many workers.

These, with sharp sickle, or with sharper tooth,
 Pare each excrescence and each angle smooth,
 Till now, in finish'd pride, two radiant rows
 Of snow-white cells one mutual base disclose.
 Six shining pannels gird each polish'd round,
 The door's fine rim with waxen fillet bound,
 While walls so thin, with sister-walls combin'd,
 Weak in themselves, a sure dependence find.

EVANS.

“The pyramidal bases and lateral plates are successively formed with surprising rapidity;

the latter are lengthened as the comb proceeds, for the original semi-lenticular form is preserved till towards the last, when, if the hive or box be filled, the sides of all the cells receive such additions as give them equal depth.

“*The cells intended for the drones* are considerably larger, and more substantial, than those for the working Bees, and, being later formed, usually appear near the bottom of the combs. Last of all are built the *royal cells*, the cradles of the infant Queens: of these there are usually three or four, and sometimes ten or twelve, in a hive, attached commonly to the central part, but not unfrequently to the edge or side of the comb. Mr. Hunter says that he has seen as many as thirteen royal cells in a hive, and that they have very little wax in their composition, not one third, the rest he conceives to be farina. Such is the genuine loyalty of Bees, that the wax which they employ with so much geometric œconomy, in the construction of hexagonal cells, is profusely expended on the mansion of the royal Bee-nymph, one of these exceeding in weight a hundred of the former. They are not interwoven with them, but suspended perpendicularly, their sides being

nearly parallel to the mouths of the common cells, several of which are sacrificed to support them.

No more with wary thriftiness imprest,
They grace with lavish pomp their royal guest,
Nor heed the wasted wax, nor rifled cell,
To bid, with fretted round, th' imperial palace swell.

EVANS.

"The form of these royal cells is an oblong spheroid, tapering gradually downwards, and having the exterior full of holes, somewhat resembling the *rustic* work of stone buildings. The mouth of the cell, which is always at its bottom, remains open till the maggot is ready for transformation, and is then closed as the others are.

"Immediately on the emergence of a ripened Queen, the lodge which she inhabited is destroyed, and its place is supplied by a range of common cells. The site of this range may always be traced, by that part of the comb being thicker than the rest, and forming a kind of knot; sometimes the upper portion of the cell itself remains, like an inverted acorn-cup, suspended by its short peduncle.

Yet no fond dupes to slavish zeal resign'd,
They link with industry the loyal mind;

Flown is each vagrant chief? They raze the dome,
 That bent oppressive o'er the fetter'd comb,
 And on its knotted base fresh garners raise,
 Where toil secure her well earn'd treasure lays.

EVANS.

"In this mutilated state only, and not in the breeding season, could Mr. Hunter have seen this cradle of royalty; for he describes it as the half of an oval, too wide and shallow to receive its supposed tenant.

"I have spoken of the perfect regularity in the cell-work of a honey-comb;—particular circumstances, however, induce a departure from this exactness: for instance, where Bees have commenced a comb with small cell-work, and afterwards wish to attach to it a set of large cells, as in the case of drone-cells being required to be appended to workers-cells. These deviations from the usual regularity renew our admiration of Bee-ingenuity, though Reaumur and Bonnet have regarded them as examples of imperfection. They effect their object by interposing three or four series of, what may be called, *cells of transition*, the bottom or bases of which are composed of two rhombs and two hexagons, instead of three rhombs; the rhombs and hexagons

gradually varying in form and relative proportion, till the requisite size, namely that of the cells which they are approaching, has been attained.

“The same gradation is observed when returning to smaller cells. Every apparent irregularity is therefore determined by a sufficient motive, and forms no impeachment of the sagacity of the Bee.

“The common breeding-cells of drones or workers are occasionally (after being cleaned) made the depositories of honey; but the cells are never made so clean as to preserve the honey undeteriorated. The finest honey is stored in new cells, constructed for the purpose of receiving it, their configuration resembling precisely the common breeding-cells: these *honey-cells vary in size*, being made more or less capacious, *according to the productiveness of the sources from which the Bees are collecting, and according to the season of the year*: the cells formed in July and August vary in their dimensions from those that are formed earlier; being intended for honey only, they are larger and deeper, the texture of their walls is thinner, and they have more dip or inclination; this dip diminishes the risk of the honey's running

out, which from the heat of the weather, and the consequent thinness of the honey, at this season of the year, it might otherwise be liable to do. *When the cells, intended for holding the winter's provision, are filled, they are always closed with waxen lids, and never re-opened till the whole of the honey in the unfilled cells has been expended. The waxen lids are thus formed;—the Bees first construct a ring of wax within the verge of the cell, to which other rings are successively added, till the aperture of the cell is finally closed with a lid composed of concentric circles.*

“The brood-cells, when their tenants have attained a certain age, are also covered with waxen lids, like the honey-cells; the lids differ a little, the latter being somewhat concave, the former convex. *The depth of the brood-cells* of drones and working Bees is about half an inch; *their diameter* is more exact, that of the drone cells being three lines* and one third, that of the workers two lines and three fifths. These, says Reaumur, are the invariable dimensions of all the cells, that ever were, or ever will be made.

*A line is the twelfth part of an inch.

"From this uniform, unvarying diameter of the brood cells, when completed, their use has been suggested, as an universal standard of measure, which would be understood, in all countries, to the end of time."

While heav'n-born instinct bounds their measur'd view,
From age to age, from Zembla to Peru,
Their snow-white cells, the order'd artists frame,
In size, in form, in symmetry, the same.

EVANS.

BEES' WAX.

BEES' WAX, in its strictest sense, is a *secretion from the body of the honey Bee*, and is that peculiar substance or material with which Bees principally construct their combs;—I say—*principally*, because the foundation of every comb is *propolis*: it is by this tenacious substance (propolis) that combs are securely attached to, and suspended from, the roof of a hive or a box,—and it is by this that they are firmly glued to the sides, wherever they are made to touch them.

BEES' WAX, however, in the common acceptance of the term, is that well-known, valuable article, obtained from honey-comb by the following process:—

Having *drained* all the honey from the combs, put them into a clean pot, together with as much rain-water as will make them float; then simmer over a clear fire until the combs be completely dissolved; and the wax and the dross mixed with it will swim at the top of the water. Pour the whole into a strong and tolerably fine canvass bag, made wide at the top and tapering downwards to a point, in the form of a jelly bag. Hold this over a tub or large vessel in which is a quantity of cold water. The boiling water will, of course, soon drain through and leave in the bag the greater part of the liquefied wax commingled with dross. Have ready then a piece of smooth board of such a length that, when one end of it is placed in the tub of cold water, the other end may be conveniently rested against, and securely stayed by your breast. Upon this inclined plane lay your dripping, reeking strainer, and keep it from slipping into the cold water, by bringing its upper part over the top of the board, so as to be held firmly between it and your breast. If the strainer be made with a broad hem round its top, a piece of strong tape or cord passed through such hem will draw it close, and

should be long enough to form a stirrup for the foot, by which an additional power will be gained of keeping the scalding-hot strainer in its proper place on the board: then by compressing the bag, or rather its contents, with any convenient roller, the wax will ooze through and run down the board into the cold water, on the surface of which it will set in thin flakes. When this part of the operation is finished, collect the wax, put it into a clean saucepan, in which is a little water to keep the wax from being burnt to the bottom; melt it *carefully* (for, should it be neglected and suffered to boil over, serious mischief might ensue, liquid wax being of a very inflammable nature) therefore melt it *carefully over a slow fire*, and skim off the dross as it rises to the top; then pour it into such moulds or shapes as your fancy may direct, having first well rinsed them, in order that you may be able to get the wax, when cold and solid, out of them, without breaking either the moulds or the wax: place them, covered over with cloths or with pieces of board, where the wax will cool slowly; because the more slowly it cools, the more solid it will be and free from flaws and cracks. You will thus have your wax in cakes, which may

be rendered still more pure by a second melting and moulding. If run into very thin cakes, and afterwards exposed to the influence of the sun and the air, frequently turned, and occasionally wetted, it will loose its yellowness, and become beautifully white. This last process is called *bleaching*, and, though more simple and practicable than that pursued in establishments where large quantities of wax are bleached—where bleaching wax is of itself a regular business—it may probably be sufficient to answer all the purposes for which *white-wax* is wanted in private families. I have by me wax of my own bleaching that is equal in whiteness and delicacy to any I have ever met with.

Good wax is a heavy, solid substance, of a deep yellow colour, has an agreeable, balsamic odour, and possesses several medicinal and other valuable qualities.

Combs that have never been filled, and those that have been filled with honey only, afford the best wax. Of the former kind but very little need ever be taken from Bees in collateral-boxes; and when any such combs are taken, they may be far more advantageously disposed of than by being melted down for the wax they contain.

Instead of crushing and melting all the combs of three or four hives together, as is mostly done by cottage Bee-keepers, the fine, clean parts should be separated from those that are discoloured, less pure, and inferior, by reason of their age,—of having been brood combs,—or of containing pollen, and should be melted first. By this very easy mode of manipulation, the quantity of wax would not be lessened, and the superior quality of the fine would command a price that would be an ample remuneration for the additional trouble attending the management of it in this way.

Should the preceding directions be thought to be tediously or unnecessarily minute, my apology for making them so is—an anxious wish on my part to render every thing relating to Bees clearly understood—understood so as to be set about and properly managed by persons who never before bestowed one thought upon the subject.

CHAPTER XVII.

CATALOGUE OF BEE-FLOWERS, &c.

FROM the account of the mode of supplying Bees with artificial food, to the enumeration of such trees, plants, and flowers, as are most frequented by Bees, for the purpose of culling from them the various substances, which their necessities, their nature, or their instinct (which is a part of their nature) urge them to seek for, the transition would have been too abrupt: therefore, to keep those subjects at a proper distance from each other, I have thought it right to insert the last chapter between them; and shall *now* proceed to give a catalogue of those trees and plants which afford pabulum for Bees. It is furnished principally from my own ocular observation, and is partly collected from the observation of others, whose curiosity has led them to pay attention to the subject, and to make remarks upon it.

Alder-tree	Celery
Almond-tree	Cherry-tree
Althea frutex	Chesnut-tree
Alyssum	Chickweed
Amaranthus	Clover
Apple-tree	Cole or Coleseed
Apricot-tree	Coltsfoot
Arbutus (alpine)	Crocus
Ash-tree	Crowfoot
Asparagus	Cucumber
Aspin	Currants
	Cypress-tree
Balm	
Bean	Daffodil
Beech-tree	Dandelion
Betony	Dogberry-tree
Blackberry	
Black currant-tree	Elder-tree
Borage	Elm-tree
Box-tree	Endive
Bramble	
Broom	Fennel
Bugloss (viper's)	Furze
Buckwheat	
Burnet	Goldenrod
	Gooseberry-tree
Cabbage	Gourd
Cauliflower	

Hawthorn	Mallow (marsh)
Hazel-tree	Marigold (French)
Heath	Marigold (single)
Holly	Maple-tree
Holly-hock (trumpet)	Marjoram (sweet)
Honey-suckle	Melilot
Honeywort (cerinthe)	Melon-tree
Hyacinth	Mezereon
Hysop	Mignonette
	Mustard
Ivy	
Jonquil	Nasturtium
	Nectarine-tree
Kidney-bean	Nettle (white)
Laurel	Oak-tree
Laurustinus	Onion
Lavender	Orange-tree
Leek	Ozier
Lemon-tree	
Lily (water)	Parsley
Lily (white)	Parsnip
Lime-tree	Pea
Liquidamber	Peach-tree
Liriodendrum, or Tu-	Pear-tree
lip-tree	Peppermint
Lucerne	Plane-tree

Plum-tree	Sunflower
Poplar-tree	Sycamore-tree
Poppy	Tacamahac
Primrose	Tansy (wild)
Privet	Tare
Radish	Teasel
Ragweed	Thistle (common)
Raspberry	Thistle (sow)
Rosemary (wild)	Thyme (lemon)
Roses (single)	Thyme (wild)
Rudbeckia	Trefoil
Saffron	Turnip
Sage	Vetch
Saintfoin	Violet (single)
St. John's Wort	Wallflower (single)
Savory (winter)	Woad
Snowdrop	Willow-herb
Stock (single)	Willow-tree
Strawberry	

Of these ~~some~~ are valuable for the supply of pabulum they afford Bees in early spring; as the *white elyrium*, broom, *crocus*, *furze*, *hazel*, *laurustinus*, *mezereon*, *oxen*, *plant-tree*, *poplar-tree*, *snowdrop*, *sycamore-tree*, the *willow-tree*, &c. Others again are valuable on

account of the lateness of the season that Bees derive assistance from them; as the *golden-rod*, *heath*, *ivy*, *laurustinus*, *mignonette*, *ragweed*, &c. Some abound with honey; as *borage*, *buckwheat*, *burnet*, *coleseed*, *currant* and *gooseberry-trees*, *heath*, *leek*, *mignonette*, *mustard*, *onion*, *thyme*, the blossoms of *apple*, *apricot*, *cherry*, *nectarine*, *pear*, and *plum-trees*, and the leaves of those trees remarkable for what is called *honey-dew*: as the *aspen*, *blackberry*, *laurel*, *laurustinus*, *lime*, *maple*, *oak*, *plane*, *poplar*, and *sycamore-tree*. Among those that are rich in pollen, may be classed—the *arbutus*, *ash*, *blackberry*, *box*, *chestnut*, *cypress*, *elder*, *laurel*, *marsh-mallow*, *turnip*, &c.

The cultivation of some of the most valuable of these is too limited to be particularly advantageous to Bees, as *alyssum*, *borage*, *burnet*, *goldenrod*, *laurustinus*, *mezereon*, *mignonette*, &c. The most extensive and lasting Bee-pasturage in this country is *clover*, *heath*, and, in my own immediate neighbourhood, *mustard*. In short, every one of the flowers, &c. mentioned in the foregoing catalogue, and others innumerable, are in their turns resorted to by Bees, and of course are more or less advantageous to them.

CHAPTER XVIII.

MISCELLANEOUS DIRECTIONS.

IN undertaking this work, as I originally did, at the pressing solicitations of several of those Noblemen and Gentlemen whose names grace the list of my subscribers, I had two main objects in view; of which a full and particular explanation of the mode of managing honey Bees in my boxes and upon my principles was one,—and the other, which I do ardently hope will result from the adoption and encouragement of my long-tried plan, is—the prospective improvement, not only of the culture and condition of those ingenious, admired, and most interesting little creatures, but also of honey and wax—the two valuable articles which Bees, and Bees alone, afford us. To prepare the way for the accomplishment of the latter of these objects, I have exerted my best

endeavours—I have spared neither pains nor expense, to give minute, and, I trust, intelligible descriptions of all my boxes and hives, of my Bee-machinery, and of every thing thereto pertaining; which descriptions have been accompanied with such practical directions and relations of experiments, as will, *if duly attended to*, enable my Bee-friends to put their apiaries upon my *humane and profitable system of management*. Therefore I do not think it is incumbent upon me to proceed farther at present. I might easily double the size of my book, by entering into and giving lengthy details of several matters relative to Bees, which are not here so much as hinted at; such, for instance, as the distance that they sometimes fly from their hives in quest of honey, and the experiments that have been made to determine that distance;—the nature of honey-dew, and how it is occasioned,—why it abounds on some trees and plants, whilst others are entirely destitute of it,—whether it is a natural exudation of the plants that afford it,—or whether it is produced by the leaf-lice called aphides;—the language of Bees, for Bees, it has been held, have their peculiar language, though I profess not to understand it, nor even to have studied it, my

business being with their *habits*;—the various diseases or maladies with which skilful men assure us they are occasionally affected;—their senses, their anatomy, and their instinct; their affinity to the wasp;—exotic Bees, from those of Lapland to those of China; and from those of Siberia to those of the Cape of Good Hope; what Aristotle hath remarked on one subject,—what Pliny hath said on another,—what classic Virgil hath so delightfully sung of the nature, economy, and management of Bees in Italy;—what Gelieu in modest prose hath said of Bees in Switzerland;—Huber and Reaumur in France, and a host of writers in Germany, and in our own native England. The discussion of some of these topics, and dissertations on others, might be made amusing, perhaps interesting, and would, at all events, swell the size of my book; but whether I should thereby enhance its intrinsic merits (if intrinsic merit it possess) is more than I dare venture to affirm. In short, these topics come not within my plan,—they are foreign to it, and I gladly leave them to be treated of by others, whose learning is more able to cope with them, and whose taste may direct them to such subjects. *I have withheld nothing that I deem to be essentially necessary to the*

thorough understanding of my practice, consequently I anticipate that my two main objects will eventually be attained—that Bee culture will become a pleasing and a profitable study—a source of instructive amusement and of profit too,—and that our country will, at no great distance of time, be everywhere studded and ornamented with neat, well-ordered apiaries. I will therefore now close my present labours with a few miscellaneous directions, chiefly recapitulatory, which, on account of their importance, every apiarian should constantly bear in mind.

Have your Bee-boxes well made, and of good, substantial materials. Strength and durability are of greater consequence than neatness, though that need not be neglected—neatness and strength are not incompatible—they may be combined.

Paint your boxes annually, when they are in their winter-situation.

Make a clear ground or floor-way from the pavilion into each of the end-boxes, by cutting away about two inches from the lower edge of each of the corresponding ends, to the depth of half an inch; and make this way or passage as near the front entrance as it conveniently

may be. This convenience has been suggested to me *since* the directions for making collateral-boxes were printed, and I therefore mention it here as an improvement, because such a way on the floor, and *without any climbing*, will afford an additional accommodation to Bees on many occasions.

Boxes will not work Bees, neither will Bees work boxes to advantage, unless due attention be paid to them.

Situation is of prime importance: for summer it should be clear and open in front of your boxes, and sheltered at their back by a north-wall or by a thick hedge.

In summer let their aspect be south-east:— in early spring and autumn due south is the best point to be in front: therefore, as spring advances turn the front of your boxes eastward, and as summer declines move them back again to their spring aspect, or, in other words, when there is not more than twelve hours' sun, let the front of your boxes be due south; and during the time that the sun is more than twelve hours above the horizon, let it be south-east.

Always have the cheerful rays of the morning sun fall upon your boxes: but contrive to

throw a shade upon their front for a few hours in the middle of the day, when the weather is very hot. Such a shade will be grateful to your Bees.

Elevate your boxes twenty inches or two feet above the ground: and always keep the grass or ground, under and near them, neat and clean, and entirely free from all nuisances.

A constant supply of water in the immediate vicinity of your apiary is highly desirable; if therefore you have not a natural supply of that element, *so necessary for Bees*, contrive to let them have it by artificial means—by placing it in or near your apiary, in large, shallow dishes, or in wooden troughs, partially covering its surface with reed or moss, and be careful to replenish them, so that your Bees may always find it there.

Suffer not ants to burrow near your Bees. Ants are enemies to Bees, and will annoy them, if they get among them.

Spiders also are Bee-destroyers; therefore, brush away their entangling webs, whenever and wherever you find them about your boxes.

Fowls should not be permitted in an apiary.

In early spring contract the entrance to an inch or less, and increase it gradually to its full extent, as you find occasion: contract it

again towards the fall of the year; and, if the moths be troublesome in summer evenings, nearly close it every evening; but take care to open it again either early next morning, or as soon as the evening flight of the moths is over. This attention is more particularly due to weak stocks, and affords them great protection against the attacks of moths, which are among the boldest, the most persevering, and, when once they have got into a hive, most destructive enemies to Bees.

Destroy wasps and wasps' nests wherever you find them in the vicinity of your apiary. The destruction of queen wasps in spring is the most effectual method of diminishing the number of these formidable Bee enemies; because the destruction of a queen wasp in spring is tantamount to the destruction of a whole nest afterwards.

Light in the domicile of Bees, if not actually prejudicial to them, is, at any rate, displeasing to them; therefore, be careful never to expose your Bees unnecessarily to its glare: never leave the window-doors open, nor suffer careless visitors to do so.

My ingenious friend, the Rev. T. Clark, of Gedney Hill, suggests the propriety of recommending that the window-doors be *self-shutting*

doors. This, he says, may be done by fixing upon each door a light, easy spring, similar to those made use of to shut-doors in good houses; or by a cord attached to each door, and passed through an eye, and over a small pulley fixed to the side of each box; from the end of which cord a weight of two or three ounces must be suspended. This weight, acting upon the cord, will draw the little doors to the windows, that is, it will shut them. The cords, eyes, and pulleys, he further says, may be so arranged, that one small weight will keep all the hive doors, in a set of collateral-boxes, closed and safe, and may be made to hang under the floor. I have no hesitation in recommending his suggestion as ingenious, practicable, and useful. The best security, however, after all, is that afforded by lock and key, the key being in the constant possession of the owner.

Ventilate your collateral-boxes and bell-glasses, when the interior temperature is at, or above, 70 degrees.

Never irritate your Bees, nor offer any sort of violence or opposition to them; and should an angry Bee or two at any time attack you, walk quietly away, and leave them to settle into peace again.

On no account drive your Bees; it is a ruinous practice. With boxes, however, I trust, it is impracticable, and totally superseded.

Never disturb, nor in any way interfere with; the middle-box.

On no account destroy any of your Bees: independently of its cruelty, it is an impolitic practice: it is like cutting down a tree to get at its fruit, which may easily be gathered by less laborious and indestructive means. Encourage your Bees,—accommodate them,—support them,—and *by all means preserve them*; and, when seasons are favourable, they will *richly* reward you for your attention to them.

Always keep a cottage-hive, or single box or two, in your apiary, for the purpose of having swarms from them, with which to stock empty boxes, or to strengthen such stocks as may stand in need of additional numbers; and proceed with such supplementary swarms as directed in pages 43, 44.

Never impoverish your Bees by taking from them more honey than they have to spare. Always suffer them to be in possession of a plentiful store. Over-deprivation distresses them, and is no gain to the proprietor. Among other reasons this is one for my repeated directions—not to touch the middle-box.

Honey of the very finest quality may commonly be obtained from collateral-boxes, as early in the season as the months of May and June, without injuring the parent-stock in the slightest degree. The enlargement of their domicile, by returning an empty glass, or an empty box, to the place from which a full one has been taken, is at this busy period of their labour an accommodation to Bees, and is one great mean of preventing the necessity for their swarming, as it enables them to continue their work at the time that there is the greatest abundance of treasure for them in the fields, and when Bees in cottage-hives cannot profit by it, owing to their want, not of inclination to gather it, but of room in their hive to store it; they therefore swarm once, twice, perhaps three times. What then can be afterwards expected from such stocks but weakness and poverty? The more numerous the working Bees are in any colony, the more honey they will collect, *provided they have room wherein to store it.* Accommodate them, then, with convenient store room, and the more workers you have in your boxes the better. Up to the middle of August you may with safety, that is, without injury to the Bees, take off glasses and boxes, as they

become ready. *After that time* it is advisable to have, and to leave, in every colony, honey sufficient for the subsistence of the Bees until next spring; and should you take off a full box, later in the season than the middle of August, instead of emptying it of all its treasure, be content with a part of it,—take a part, and *return a part—share it with your Bees, and let their share be a liberal one.* As has been already enjoined—*on no account impoverish them by over-deprivation,* at that precarious season especially. They possibly may collect much honey after that time; if so, share with them again; if not, have them rich from your first bounty.

Previously to withdrawing the tin-divider, for the purpose of opening the communication into an end-box, take off the end-box and dress its inside with a little liquid honey; this will bring the Bees into it, when, but for the honey, they would perhaps refuse to enter it; and at that time close the ventilation. It is wrong to ventilate empty boxes, because it drives the Bees into the pavilion; and it is a fact that they will swarm from the pavilion, rather than take possession of an empty end-box, if its temperature be, and be kept, disagreeably cold, by having the ventilation

open at the very time it should be carefully closed. This will both explain and remedy the difficulty that some apiarians complain of having experienced in getting their Bees to take possession of an empty-box; it will also account for swarms sometimes leaving the pavilion when there is no want of room: the fact is—that the temperature of *that room* is not agreeable to them: but it is owing to the mismanagement of the apiator that it is otherwise than agreeable.

Whenever a box is taken off, be careful to open the perforations in the cylinder ventilator, many of which will be found sealed up with propolis. These perforations may be cleared at any time, by introducing a piece of wire with a sharpened point, turned so as to pick out the propolis; but they are most effectually opened when a box is off.

Towards the latter end of November, or earlier, if the weather be inclement and severe, remove your Bee-boxes to their winter-situation: this should be *dry, quiet, cool, and dark*, and place your boxes in it so that they may front towards the north or north-east.

Guard and close the entrance with a piece of fine wire-cloth, or of Lariviere's patent tin, made fast to the box, either of which will

confine the Bees within their domicile; admit plenty of fresh air, and keep out inimical intruders. Thus prepared for winter, having every tin and block in its proper place, *disturb your Bees as little as possible*, and, come winter as it may, they will pass it in that state of semi-insensibility or torpor, which nature, or, with reverence let me rather say,—nature's God has appointed for them.

Towards the end of February, or as soon as vegetation begins to make its appearance, take your boxes from their winter to their summer stands, and commence another course of attentions, observations, and humane management, similar to that herein directed and explained. And, though cases may arise, and difficulties occur in the course of your practice, for the remedying of which no specific directions are, or can be, here given, your own experience and progressive improvement in the pleasing science of Bee-management, will lead you to adopt the proper mode of treating the former, and the best means for surmounting the latter.

THE END.



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